THE

VETERINARY JOURNAL

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THE LATE MR. JAMES CLARK, F.R.C.V.S.

STUDENTS and graduates alike will learn with the deepest regret of the death of Mr. James Clark, of Coupar Angus, which took place on Thursday, April 25. To the students especially he was well known, and by his kindly manner when exercising his function as examiner, he found a very warm place in their esteem. The oldest member of the Examining Board, and by common consent looked upon always as their Chairman, Mr. Clark was as universally popular with his colleagues as with the students he had to examine. To the nervous student he was kindness itself, and no man ever failed to answer Mr. Clark's question on this ground, as he possessed the happy knack of at once putting such a one at ease; at the same time he was always quick to detect the lazy ones, and they, at all events, got no mercy at his hands. Born in 1847, he graduated in Edinburgh in 1868, and obtained the Fellowship in 1887. He was elected as one of the Examiners in Cattle Pathology in 1891, and retained that post until the four years' scheme came into force, when he acted in the dual capacity of Examiner in Materia Medica, including Therapeutics and Toxicology, and (for the men who still remained under the three years' course) as Examiner in the subject of Diseases of Cattle.

Residing at Coupar Angus, N.B., his consultation and general practice was a very wide one, and it is to be feared that excess of zeal for his professional duties in the interest of his clients contributed largely to the series of illnesses which preceded his death.

His place will be hard to fill, both in the profession and for the large *clientèle* who had every confidence in his skill and judgment.

Editorials.

MOTOR *v.* HORSE 'BUSES.

WE have seen and heard much of late on the so-called "passing of the horse," and one strong argument which has usually been brought forward to show us that the days of horse traction are numbered, has generally been the introduction of considerable numbers of motor omnibuses. Each motor was calculated to replace two horse 'buses, and as each horse omnibus requires ten horses to run, twenty horses are withdrawn from the streets for each motor 'bus turned out. Bearing that in mind, when one saw so many motor 'buses running, one was almost irresistibly driven to the conclusion that the horse vehicle would soon be a relic of the past. But there is another side to the question. When we read the reports of the motor 'bus companies, and find that they are running at a very great loss, we have more than a gleam of hope for the prospects of the popular 'bus horse. Unless very marked improvement in the motor 'buses is rapidly forthcoming, there is every reason to believe that they will die a natural death, and that the old horse omnibus will again come to the fore, especially as a feeder to the electric cars and tubes. We know of several large proprietors who were very successful in the days when they were content to run horse omnibuses, and who have been in some cases quite, and in other cases almost, ruined by having adopted motors. We know of one proprietor of six motor 'buses (representing a capital approximating to £6,000) who on a recent bank holiday had all his vehicles in dock, when he had been anticipating reaping a small harvest on that day in particular. He has since locked them all up in a shed, has put the key in his pocket, and dismissed all his motor-men. He said he was losing money on each 'bus daily, and that it paid him better to let the capital lie idle. This same proprietor has upwards of 500 cab-horses, and one day recently, when we casually visited his yard, *not one* of them was incapacitated either by sickness or lameness. What a contrast—even if we admit that the latter is an unusually exceptional condition! In another case a certain proprietor gave up his motor 'buses, and sent them to be sold by auction. They cost about £850 each, but the only *bona-fide* bid was so ridiculously low that one might be forgiven for being sceptical towards it. It was £2. Needless to say, the 'buses

were withdrawn, and a day or two ago one was being broken up for old iron in an iron-yard. Probably many others will share the same fate. In another case this week the proprietor of twenty-two motor omnibuses had fifteen incapacitated, more than two-thirds being unable to work. A very interesting statement was made recently by Mr. R. S. Tilling, when presiding at the Annual General Meeting of Thomas Tilling, Ltd. The following is quoted from the report of the meeting in the *Daily Telegraph* of the 24th ult.: "They had 6,000 horses running, and good animals were never more difficult to find or dearer to buy than at the present time. On the subject of trade horses, it had been conclusively shown that a moderate load at a moderate distance could not be so cheaply conveyed by mechanical traction as it could by horse power, and their business in that direction had shown a very gratifying increase. A great deal had been written about the passing of the horse, but his own opinion was that there was a large future, as there had been a long past, for this great friend of man." In view of such a statement, made by one with so great experience of both horses and motors (we believe Tilling's build their own motors), we feel fully justified in our opinion that the prospect for the horse is still a bright one, and we recommend breeders to continue breeding, knowing that there is always a good market for a good horse of any type.

Just as we are going to press we see that still another motor omnibus company is advertising that their vehicles will shortly be put up for auction, and in the same issue we see that there has been a meeting of the creditors of another motor company, whose accounts show a deficiency, as regards contributories, of over £10,000. So much for this rival of the horse.

ADVANCES IN VETERINARY EDUCATION IN AMERICA.

IN the February JOURNAL it was announced that the sum of $250,000 had been tendered to the University of Illinois for the founding of a veterinary college in Chicago, and we can now state further that the University has asked the State Legislature for a liberal grant for the necessary expenditure of conducting the College; which, if granted (as is probable), the opening of the new college under favourable auspices is assured.

On p. 261 of this issue appears a detailed report of a recent meeting of the Central Canada Veterinary Association, at which

Dr. J. G. Rutherford, Veterinary Director General for Canada, who had been made chairman of a committee of the association to attempt a reorganisation and improvement in the veterinary teaching schools, made a comprehensive statement of the present conditions and the outlook for the immediate future.

As shown in the extended article upon veterinary education in America, in the December JOURNAL, Canada has but two veterinary schools, Laval University, where all teaching is in French, requirements are low, equipment insignificant, and students very few, and the Ontario Veterinary College, with two sessions of less than six months each, an insignificant matriculation requirement, moderate facilities, and large classes. Standing in the front rank as regards the number of students in its classes, it numbers among its alumni approximately one-half the veterinarians of America.

While we have already alluded to impending changes in this school, the report cited gives a far more complete conception of their scope. It wipes out of existence in America the last college having any claim to respectability in which candidates may graduate in veterinary science in two years. It marks the establishment of one more Government College under the control of an eminently meritorious university. This means higher matriculation, not for this one college alone, and gives aid and support to others in the United States which are essential competitors.

Canada needs a first-class Veterinary College for the safeguarding of her vast live-stock interests; the Government is able to support it well, be its students few or many, and Toronto furnishes an ideal location with an ample supply of excellent and varied clinical material.

In the primitive days of veterinary education in America, the Ontario Veterinary College played an important part, and under the proposed changes it cannot fail to accomplish a great work.

THE ONTARIO VETERINARY COLLEGE TO BECOME A GOVERNMENT SCHOOL.

CANADA TO INSTITUTE A MEAT INSPECTION SERVICE.

Annual Meeting of The Central Canada Veterinary Association.

The above Association met at the Carnegie Library, Ottawa, on Monday, February 4, 1907.

Present:—Drs. Rutherford, Higgins, Hilton, Harris, McNab, Hollingsworth, S. A. Walsh, Marshall, Beach, Higginson, Telmosse, Kenning, McGuire, Thacker, Haworth, Labrosse, Pallister, Lynchke, Monk, Hadwen, McGill, James and Young.

Drs. Dufresne, F.A., and A. R. Walsh, were elected members.

The President stated that he felt safe in saying that one of the most important subjects to come before the meeting was the good news in regard to Veterinary Legislation from Dr. Rutherford. The live-stock interests of the country were expanding, and much depended on the veterinarian. The transcontinental roads under construction, the lumbering in the country, and the immigration in the west, all created a great demand for horses, to say nothing of local needs. He wished to thank all those to whose aid and co-operation the success of the meeting was due, particularly to their Hon. President, Dr. Rutherford, for his untiring and unselfish efforts to elevate the profession in Canada.

Dr. Rutherford, Veterinary Director General of Canada, then stated that it afforded him pleasure to be among them that evening, especially since at the last meeting his health had been in a very precarious state, from which he had happily recovered. He supposed that those present were more interested in veterinary education than in any other subject.

The matter of veterinary education, as dealt with at the last meeting, was left at the point where he had gone to Toronto on January 25 of last year (going a day or two earlier on his way south) to keep an appointment with Mr. J. W. Flavelle, the chairman of the committee appointed by the Ontario Government to discuss matters in connection with the Ontario Veterinary College. At the meeting which resulted, Mr. Flavelle was present, as also Mr. Kilgour and Mr. C. C. James, the Deputy Minister of Agriculture, and he explained to them, as most present had heard him relate, the seriousness of the situation so far as it regarded the education of veterinarians in Canada, and the urgent necessity which, in his opinion, existed for some effective action being taken. The interview was an extended one, they went over the ground pretty thoroughly, with the result that, when Mr. Flavelle brought in, as chairman, the report of the University Commission, it recommended that the Government should take over the College. They were all aware that in the fall of 1905 the Reorganisation Committee, accompanied by Professor Smith himself, waited upon the Hon. Nelson Monteith. Previous to that, in June, 1905, he had taken the opportunity of having an interview with Mr. Monteith, so that he was fairly well prepared for the report of Mr. Flavelle and his colleagues, and also to take over the College.

"Those of you who know Professor Smith, know that he does not like to be hurried, and he is going very slowly and deliberately. There is a little difference between him and the Government as to the price which he thinks it should pay him, and he is hanging fire, as it were. Those of you who have received the announcement of the College will know that there is at last the long looked for statement that students will have to go in for a three years' course. The Government is going to take the College over about May 1, 1908. Students who went in this year will be allowed to graduate as heretofore in two years. Students next fall, while admitted under the auspices of Professor Smith and the present management of the College, will be entered for three years, whereas if the present arrangement is carried out, and I have not the slightest doubt that it will be, in 1908 they will have to pass a pretty strict matriculation, and would take a three years' graded course laid down by the new Board appointed by the Department. The College will at that time be conducted as is the Agricultural College, that is, properly and regularly affiliated with the (Toronto) University.

"There is also a proposition that, in addition to the ordinary diploma, which will be given to the student who passes his different examinations, there will be a further, a University degree, given for those who take another year, which I deem very proper. I was a little disappointed at having to wait so long, after having, as it were, won the fight and seen the day star spring from on high, that we would have to wait until 1908; but, after all, when I look to the time when I graduated in 1879, and remember that I had been waiting for improvement ever since, I thought that perhaps it was not so long after all, and that we should be thankful for small mercies.

"I have also another subject for congratulation. You will recollect that, some years ago, we had a meeting of the American Veterinary Medical Association in Ottawa. After a great deal of effort to entertain our American cousins, and after paying all our debts, we had $109.50 left. It occurred to me that it would be a very nice little nucleus upon which to base an appeal to the profession for funds. When the troubles of the committee who had collected the money were over, it was decided to hand it to the Ontario Veterinary Association, and at a meeting, Christmas 1903, this was done. Ever since then the money has been accumulating. We have $650 in the Savings Bank, drawing interest. We do not need it now for the purpose originally intended. Circumstances have rendered it unnecessary for us to take any action as private practitioners or as veterinarians generally, or through private members of the Legislature, or in any other way. The Minister of Agriculture, the Hon. Nelson Monteith, himself, has agreed to the Ontario Veterinary Association's demands, and appreciates the importance of higher veterinary education, and to him we owe, I think, a debt of gratitude for the stand he has taken. We are relieved at once, by the action of the Hon. Nelson Monteith, from any responsibility to secure legislation, and need have no more of the various abortive measures which were previously offered, when this member or that sought to introduce Bills, and influence was brought to bear, lobbying was done, and the Bills were thrown out. We will have a Bill brought in by the Government itself. The College will be dealt with as a Government institution, and our little fund of $650 will therefore remain untouched.

"I may say that while the new Ontario Government deserves a certain amount of credit and consideration in connection with the subject of which I have been speaking, in other respects it has been less praiseworthy. Two years ago a person was elevated to the dignity of membership in the veterinary profession by special Act of Parliament. The members of the veterinary profession did not appear to do anything, and last year when another man was made a Veterinary Surgeon by Act of Parliament, there was the same inaction. This year the same thing is going to be tried, and a man rejoicing in the name of Brisson, of the township of Russell, in the county of Russell, is petitioning the Legislature to be created a Veterinary Surgeon by special Act of Parliament. As soon as I received this information, and I may say that I knew nothing of the cases of last year and the year before, I notified our Secretary and Dr. Sweetapple, the Secretary of the Ontario Veterinary Association. I have written several other letters and have asked Dr. Sweetapple to take action immediately and call a meeting of the reorganisation committee for this week.

"I have one thing more to lay before you, slightly different in character from those which have gone before, in relation to my Department work. Those of you who have received the various publications of our branch will be in a position to know that we have not been idle.

"We have had legislation before Parliament, the Meat Inspection Bill, which also provides for the inspection of vegetables, fruit and fish, but with the latter articles we do not, as veterinarians, have to do. Speaking plainly, there are no meat inspectors in Canada. There may be here and there a veterinarian who has been a meat inspector. If so, I don't know him, and I know the great majority of the veterinarians in this country. There is a provision in this Act calling for an examination, which will be provided by the Governor in Council, but naturally some of the rest of us will have something to do with the preparation of the examination papers. We are going to have an examination and no man can be appointed an Inspector under the Act without passing it. In order to enable veterinarians to pass that examination, it will be necessary for them to study. From forty to fifty meat inspectors will be required very shortly. We have, as you know, a very large staff of veterinarians engaged in dealing with outbreaks of contagious disease. Five years ago we spent some $60,000, while in the last fiscal year some $465,000 was expended. The work has very largely increased all over the country. These men, as you know, have been appointed without examination, but after the new Meat Inspection Bill comes into force, I am inclined to think that the only way in which veterinarians will be able to enter the service of the department will be through the examination provided by the Bill.

"When we start demanding an examination we will stick to it. I realise that there will be considerable difficulty in promptly getting anything like the number of properly trained Inspectors we want. The salaries that we propose to pay are not large enough to tempt a man of mature years who is established in practice and is in comfortable circumstances. They are, however, quite big enough and quite good enough for a young man leaving college, especially if single, and would enable him to put by a little to start himself in practice later on. We propose to pay about $1,200, and of course

those salaries will be increased as the Inspectors develop a knowledge of and aptitude for their duties. The need for veterinary services in the inspection of food is constantly increasing throughout the civilised world. I may say that I have advocated for the last three or four years, the advisability of making provision for meat inspection, in view of the large and constantly increasing meat trade.

"You know it requires a good deal to move a Government, and until the 'Jungle' came along, as also the excitement in Chicago, and affected the trade for canned meat in England and Europe, the Government of Canada did not realise that it was necessary to take some action in the matter. Even then it was felt for a considerable time by those in control that we did not require it in Canada—our people were so thoroughly good and honest and careful of the health and well being of their fellow creatures throughout the world, that there was little danger of diseased or decomposed meat or anything of that kind being packed in Canada. However, we began to find things not so good as they were supposed to be, with the result that the Meat Inspection Bill was introduced in December, and has now passed its third reading, and is going before the Senate in a day or two. We have no meat inspectors yet. As soon as I realised that we were really committed to it I took the matter up, with Professor Smith, and endeavoured by all the means in my power to get him to inaugurate a course of meat inspection through January, February and March. I also talked to the young men, pointing out the importance to the Department and to the profession, but while they agreed that it was important to both as also to them, I have not been able to get an answer. I have hoped and may yet be able to get matters started in Toronto early and have the course continue as long as circumstances will permit. This course would be available for old graduates as well as those now at the College, and any veterinarian who feels like going in for a special course of meat inspection might, I think, be able to fit himself for the work, taking the examination, say, in April or May next and being appointed on his succeeding in passing. Any graduate of a recognised veterinary college can take the examination. I thought that I would bring this before the meeting so that there might be no misapprehension, and I will be glad to give any gentleman who may think of going up for the examination as much information as I possibly can which is likely to be of use to him."

Dr. Young enquired concerning the proposed disposition of the unneeded legislative fund to which Dr. Rutherford had alluded, and the latter suggested that it be increased and the income therefrom devoted to aiding a worthy veterinary student, in the form of a scholarship.

The President enquired whether persons entering meat inspection service would need abandon practice.

Dr. Rutherford: Oh yes, not only in connection with Meat Inspection, but we are not now appointing veterinary inspectors who are private practitioners. The moment he becomes an inspector he has to give up his private work. I refer, of course, to salaried inspectors. We have gentlemen as Inspectors who are paid only by fees, but when a man enters our salaried list, he must abandon his practice and become a public servant. Paying a salary to a practitioner is not advisable either from a departmental or a professional point of view. We, there-

fore, take men entirely from practice, and if an Inspector studies and looks up the specialities he has to deal with in the course of his work, his salary very soon begins to increase, and his services are recognised.

Mr. Harris: I am sure, Mr. President and gentlemen, you have all listened very closely to what Dr. Rutherford has told you in regard to the Ontario Government taking over the College and establishing it on a better foundation. There is no doubt that Dr. Rutherford has done a great deal for the veterinarian in Canada (hear, hear), and I do not know any man who has done as much. He was not only the means of establishing the Central Canada Veterinary Association, but was the means of bringing the Ontario Veterinary Association to life. I am sure that there is no other man in Canada who could have done as much as Dr. Rutherford. He has done it for the benefit of the practitioner, and has helped to bring the profession together, and to bring it to the standing which it should have. I would like to move that a very hearty vote of thanks be tendered to Dr. Rutherford by this Association. Carried.

Dr. Rutherford: I am sure I thank you very kindly for this freely expressed good will, and can only say that my efforts have been but a labour of love. I have never been anything else than a veterinarian; twenty-two years I was a practitioner, and therefore know the difficulties, troubles and hardships of a veterinarian, and that his lot is capable of a great deal of improvement. It has not been favourable in Canada —in fact, very unfavourable. I think we are about to better it, I hope we are. I trust we are, and if I have been in the slightest degree instrumental in bringing about a better condition of affairs, as I said before, I am perfectly satisfied.

The Secretary stated that Dr. Rutherford had informed him that two members of the Dominion Parliament, Messrs. Walsh and Boyer, were veterinarians. The Secretary then read a letter from Dr. Rutherford in regard to the application of J. Brisson to be created a veterinary surgeon by Act of Parliament.

Dr. Higginson, dealing with the Brisson case, stated that he had met that gentleman a few times, that he was a farmer in the township and county of Russell, running a farm there, besides doing a little in the lumber business. He had been "quacking it" ever since he knew him. As far as his character was concerned, he is a good enough citizen. He has no qualifications. He understood that Brisson told several people that he had graduated at some American college, but he was certain that he had not. He was only away on the American side for a short time, a few months, and H. was sure he could not have graduated in that time.*

Dr. Labrosse stated that he had not met, but had heard of him, and in his judgment it would certainly not be advisable to permit him to carry his project through.

Dr. Rutherford advised that vigorous resolutions be passed against such abuse of the prerogative of Parliament as is implied in a proceeding to make a veterinary surgeon by an Act of the Legislature, and sending these to the Provincial Secretary and the Minister of Agriculture. Even better, he thought, would it be for each and every man to write a strong personal letter to his member in the Legislature

*We would not like to be so certain on that point.—W.L.W.

protesting against such action, and to get all other veterinarians of his acquaintance to do the same.

As officers for the following year Dr. Rutherford, Veterinary Director General of Canada, was again made Hon. President, Dr. Thacker, President; Dr. James, Secretary-Treasurer, and Dr. Hollingsworth, Vice-President.

Upon motion, Dr. Higgins was made official reporter.

Dr. Haworth read an interesting paper on "Azoturia," which was freely discussed.

Dr. Hollingsworth read an interesting paper on "Dental Teratoma," which was greeted with applause. The Secretary read a letter from Dr. A. G. Young, suggesting as a topic for discussion, "If a stallion has pink eyes, what length of time afterwards is he a source of contagion?"

Dr. McGuire read a paper on "Sanitary Water Supply for Stables," which was greeted with applause.

On the second day of the meeting the laboratories of the Central Experimental Farm were visited, and they also inspected the experimental tuberculous herd of cattle which was being subjected to continuous "out-of-door" treatment in the rigorous climate of that region.

It was decided to hold the Midsummer Meeting in Ottawa and the clinic at the Experiment Station, where exceptional facilities are obtainable, these being placed at the disposal of the Association by Dr. Rutherford.

THOMAS THACKER, *President.*
A. E. JAMES, *Secretary-Treasurer.*

Original Articles.

NOTE ON THE CUNEIFORM CARTILAGES OF THE HORSE'S LARYNX.

BY J. A. ROBERTSON (FROM THE ANATOMY DEPARTMENT, ROYAL VETERINARY COLLEGE, EDINBURGH).

As is well known, during the evolution of species structures undergo change and modification, either as the result of disuse, or in the direction of better adaptation to changed habits of life or surroundings. Muscles have degenerated into ligaments, and even bones and cartilages have altered during the transition from the past form of the organism to the present. The horse exhibits many examples of such degenerative change.

If the conclusions drawn from comparative anatomy be correct, the cuneiform cartilages of the larynx of the horse are neither so extensive nor possess the same connections as was formerly the case. In the average horse they form projections from the base of the epiglottis, and reach for some distance towards the arytenoid cartilages. It seems reasonable to suppose that originally they formed a link between the

epiglottis and the arytenoid cartilages, as they still do in the Edentates.

In the horse the tips of the arytenoid cartilages are composed of elastic cartilage, thus differing from the rest of the structure. In man they are represented by separate nodules known as the cartilages of Santorini (*cornicula laryngis*). In man, moreover, the cuneiform cartilages (cartilages of Wrisberg) are independent of the epiglottis; small in size, often absent in white, but apparently always present in black races. According to Göppert,* there can be little doubt that the

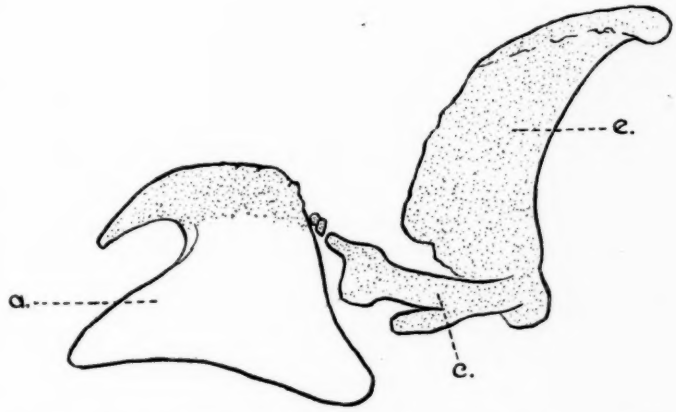


FIG. 1.—Epiglottis and arytenoid viewed from the left, *e*, Epiglottis; *c*, left cuneiform cartilage; *a*, left arytenoid cartilage. The dotted areas indicate the distribution of elastic cartilage.

human cuneiform cartilages were originally parts of the primitive epiglottis, and comparative anatomy certainly supports this view. Kallius,† from his recent observations on the development of the human larynx, leans towards the opinion that the embryonic cuneiform cartilages of man, may be connected with the arytenoids, a connection which is lost in the adult.

Bland Sutton ‡ regards the false vocal cords, with the cuneiform cartilages, of man, as the degenerate representatives of the bar of cartilage by means of which the epiglottis and cornicula laryngis were originally united.

The degree of development of the horse's cuneiform cartilages is variable within fairly wide limits. Sometimes they are sufficiently long to reach within a short distance of the arytenoids, at other times they are relatively short. In a recent dissection-subject the cartilages were unusually well developed, and are deserving of description. They were, as usual, attached to the base of the epiglottis, and to its anterior surface, where the right and left cartilages were joined together immediately ventral to the attachment of the hyo-epiglottideus muscle. The left cartilage presented a deep notch in its lower border, which practically cut the cartilage into two parts. A glance at fig. 1 will

produce a better understanding of the form of the cartilage than would a lengthy description. The extremity close to the arytenoid was pointed, and connected with it by fibrous tissue was a small cartilaginous nodule. In the figure the cartilages are slightly separated from each other for diagrammatic effect. In the actual specimen the cuneiform and arytenoid cartilages were in contact.

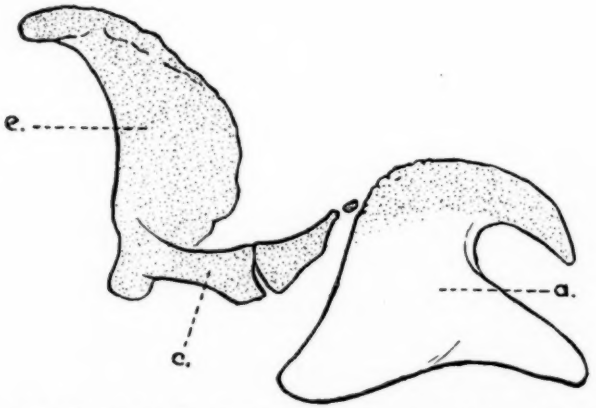


FIG. 2.—Epiglottis and right arytenoid viewed from the right. *e*, Epiglottis: *c*, right cuneiform cartilage; *a*, right arytenoid cartilage. The dotted areas indicate the distribution of elastic cartilage.

Fig. 2 represents the form of the right cuneiform cartilage, which was not very unlike the left. Here there were two small nodules attached to the tip of the cuneiform, and in contact with the arytenoid.

In the specimen here described it seems reasonable to assume that the cuneiform cartilages present the characters of a condition more primitive than that obtaining in the average horse, and lends support, if such were needed, to the assumption that the epiglottis and the elastic part of the arytenoid were originally one and the same cartilage.

* Göppert, E. "Ueber die Herkunft des Wrisberg'schen Knorpels," *Morph. Jahrbh.*, Bd. 21., 1894.

† Kallius, E. "Beiträge zur Entwickelungsgeschichte des Kehlkopfes," *Anat. Hefte.*, Bd. 9., 1897.

‡ Bland Sutton, J. "Ligaments: Their Nature and Morphology." Third edition, 1902, p. 80.

Clinical Articles.

A LEIOMYOMA OF THE TERMINAL PORTION OF THE ŒSOPHAGUS IN A DOG.

BY A. E. METTAM, B.Sc., M.R.C.V.S., PRINCIPAL OF THE ROYAL VETERINARY COLLEGE OF IRELAND.

THE specimen which I am about to describe was brought to me by one of my students, Mr. J. Doyle, who gave the following history:—

The subject was an Irish terrier dog, believed to be about 12 or

Leiomyoma of the Œsophagus. A, Tumour growth; B, Œsophagus.

13 years old. The animal had been in the possession of its owner for some six or seven years, and had enjoyed perfect health up to within a fortnight of the time he was brought for treatment. He had been

vomiting freely, and developed a weakness of the hind quarters which gradually became worse. He had a peculiar, staring appearance; the pupils were dilated, the neck stretched out and fixed. He was apparently blind, as he knocked up against objects when moving about.

He was put on a course of sedatives, but the efforts at vomition continued as bad as ever. Nothing was brought up from the stomach, save perhaps some mucus, which, mixing with the saliva, hung in strings from the mouth. The animal was eventually destroyed, as the case was considered a hopeless one.

Mr. Doyle, who made the *post-mortem* examination, reports that he found the stomach pressed up against the diaphragm, and a firm body as large as a tennis ball could be felt between the stomach and diaphragm. The diaphragm was depressed where the new growth was in contact. The new growth involved the termination of the œsophagus where the latter enters the stomach. It encircled the gullet for quite seven-eighths of its circumference, and in section had something of the outline of a horseshoe. In its thickest part the tumour was rather more than 3 inches in thickness from the gullet to its periphery. The *foramen sinistrum* of the diaphragm was greatly dilated, so that the collapsed œsophagus appeared to lie quite free in its passage through the diaphragm.

The tumour was of a pale pinkish-grey colour, and on section showed a number of whitish specks like to plaster—centres of degeneration. In structure the neoplasm is a leiomyoma—a smooth muscle tumour.

The photograph shows the tumour in section as received. The œsophagus passing through the tumour can readily be made out, as also can the foci of degeneration, which are the white, irregular specks upon the surface of section of the tumour. The mucous membrane of the stomach is apparently quite healthy.

CANTHARIDES POISONING IN A HORSE.

BY HERBERT KING, M.R.C.V.S., KENNINGTON, S.E.

THE subject was a bay gelding, the property of a 'bus and cab proprietor. He had been affected with pneumonia, and had become practically convalescent. The foreman of the yard, however, thought the horse was rather constipated, and he ordered the sick-horse attendant to administer half a pint of linseed oil. It happened that the linseed oil and some blistering oil were kept in similar bottles, and at this time they were close together, and contained about equal quantities. The man thus carelessly took up the bottle, which he wrongly thought was linseed oil, and without attempting to verify it, as he might easily have done by the smell, he gave half a pint of the contents, which consisted of the following: ol. lini, ℥v., ol. tereb ℥v., and pulv. canthar. ʒxiv. This was given at night as a drench.

The next morning, when the man went to the horse, he found him very much blistered about the mouth and lips. When I saw

him the animal was somewhat distressed and was blowing slightly, and continually passing large quantities of urine. The pulse was frequent (90 per minute), and very quick and feeble. The temperature at that time was 100° F., but soon became subnormal. The animal did not show any particular abdominal pain beyond the frequent urination. The whole of the mucous membrane of the lips and mouth was blistered, and subsequently destroyed. The mouth and throat were very painful, causing dribbling, and the pain extended all down the neck, the œsophagus being evidently in the same condition as the mouth. He absolutely refused all food for four or five days, after which he took a little oatmeal gruel and a little soft food. It was quite impossible to touch his mouth to give any medicines, either draughts or electuaries, so solutions of belladonna were injected *per rectum* with nutrient enemata.

About the fifth or sixth day blood was being passed in rather large quantities with the urine, and there was slight abdominal pain. When he began to show signs of collapse hypodermic injections of ether sulph. were given two or three times a day. Death occurred on the tenth day after administration of the mixture.

On *post-mortem* examination the kidneys were found to be very much inflamed, and large abscesses were present in each. The bladder contained several large hæmorrhagic spots in clusters. The stomach showed one large ulcerated patch about the size of a five-shilling piece or a little larger. The small and large intestines were much congested. The lungs were also congested, and the endocardium was of an *intensely deep purple hue.*

The chief points of note during life were the quick, weak pulse, the subnormal temperature, the excessive and continual urination, the bowels inactive except with the aid of enemata, and, in general, the quiet behaviour of the patient showing no particular abdominal pain.

SARCOMATOUS TESTICLE IN A DOG.

BY H. GIBSON, B.A., M.R.C.V.S., BELFAST.

Subject: A fox terrier, aged 4, which had always appeared in good health. He had a large swelling in the perinæum, which had the appearance of a scrotal hernia. On manipulation it was soft behind, but alongside the prepuce it contained a large hard lump.

The dog was fixed and chloroformed for operation in the usual way. On puncturing the swelling about a pint of bloody fluid escaped, and on opening it up we found that the hard mass was an enlarged testicle, which was removed by ligature and ecraseur. The testicle was about the size of one's closed hand. I forwarded it to Professor Mettam, and on microscopic examination he pronounced it to be sarcomatous. On making enquiries I have since found out that this testicle had always been misplaced, as it was alongside of the penis, and not in the scrotum; but I was unable to ascertain how long it had been enlarged.

TETANUS IN COWS AFTER CALVING.

BY H. GIBSON, B.A., M.R.C.V.S.

Subject : A roan shorthorn cow, aged 8. The cow calved on March 8, without any difficulty. I was called out to see her on the 11th, as she had retained her fœtal membranes. Her pulse was 62 per minute, and temperature 103·2° F. I removed as much of placenta as possible, which was very putrid. I then washed her out, and left instructions for the same to be done twice daily. She got three times daily powders consisting of sod. hyposulph., nux. vom., and ammon. carb. Next morning I saw her again, when her temperature was down to 101·6° F., pulse 56, and appetite fairly good.

On the 16th the owner called to ask if he might stop the washing out, as all discharge had ceased. On the 18th I was called out again, as she had refused her food that morning, and was very weak on her legs.

On examination I found she was suffering from tetanus, her jaws being locked, so I ordered her to be destroyed. Infection must have taken place through the uterus, as there were no signs of any wound on other parts of body.

Since then I have had another case in a cow which had calved about ten days previously, but had not retained the placenta, and appeared otherwise to be doing well.

NOTES ON TWO CASES OF RUPTURED TRACHEA.

BY S. H. GAIGER, M.R.C.V.S., INDIAN CIVIL VETERINARY DEPARTMENT, PROFESSOR IN THE PUNJAB VETERINARY COLLEGE, LAHORE, INDIA.

A MONGREL terrier, about 40 lb. weight, was brought to the dog hospital of the Lahore Veterinary College by a native, who said the dog first showed signs of emphysema two days previously.

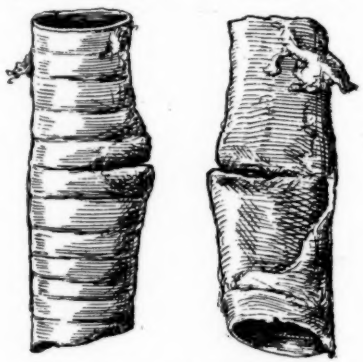


FIG. 1.—Fracture of the trachea of a dog.

The dog was enormously swollen and puffy, due to subcutaneous emphysema, and resembled more than anything a football, into which one could sink one's fingers.

The nose was poked out, and all four legs were stuck outwards from the body, the animal being unable to stand with them straight under him. Immediately I saw him I inserted a scalpel into the skin of the neck and air bubbled out, coming in great force on pressure, but as soon as the swelling was reduced it appeared again.

Over the larynx was a small dried up skin wound said to have been the result of a fight, and we suspected a corresponding hole in the larynx, but none could be detected. The dog collapsed from suffocation ten minutes after admittance, and we wished to have a *post mortem* examination, but the owner, who was a Hindu, had strong objections. Later, he consented to the neck being opened if subsequently sewn up again. All the tissues of the neck were dissected by the air, the muscles, arteries, nerves, trachea, and œsophagus being beautifully exposed on section of skin. The trachea was found to be ruptured half way between larynx and first rib, as shown in the drawing fig. 1. The bulging at the seat of rupture is due to flattening of the trachea.

Fig 2 shows another case of tracheal rupture, this time in the thoracic portion, with no clinical symptoms. This occurred in a sheep, which was one of a lot of experimental sheep kept at the College.

The sheep on *post-mortem* was found to be very badly infected with *Echinococcus polymorphus*, the liver and lungs being enlarged and one mass of cysts.

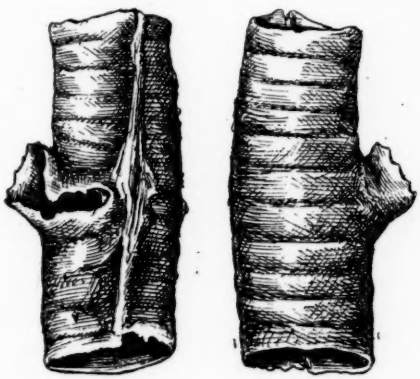


Fig. 2.—Rupture of the trachea of a sheep.

I cannot account definitely for the rupture, which might have been due to the condition of the lungs prohibiting their expansion with the chest expansion, or, what seems more likely, to the formation of a cyst in the wall of the trachea and subsequent rupture of the cyst, but no trace of a cyst could be found in this position. From the appearance of this rupture it was certainly of some standing, and from the edges one might suppose there had been bulging of the trachea some time previous to actual rupture, as the edges were extremely thin and could not be placed in apposition, as could have been done in a recent case.

GUT-TIE IN CATTLE.

BY W. W. GRASBY AND H. S. REYNOLDS, M.R.C.V.S., DAVENTRY.

THE following series of cases of so-called "gut-tie," or "pelvic hernia," appears to us to be of considerable interest, and especially so since there are very few accounts of it in English veterinary literature.

CASE 1.—A Shorthorn bullock, aged about 18 months. While out at pasture he was noticed to be dull, and was standing alone. On closer observation by the owner, symptoms of colicky pain were noticed, and Ol. Lini Oii. was administered. On the following day Mag. Sulph. ℥viii. were given; but as no fæces were passed, further advice was considered necessary, and we were called in. On our attending at the farm the third day after the beast was noticed amiss, he was watched for about ten minutes, during which time he stood fairly quiet, with his tail held between his legs. He was backed up against a wall, occasionally making a few steps forward and backing again to the wall, and now and then kicking forward at his belly with either hind leg. On walking him round the shed he lifted his tail and strained slightly, and passed some quantity of mucus in pieces about the size and thickness of an oyster. An examination was made *per rectum*, which was dilated, and the diagnosis of "gut-tie" was confirmed.

The owner consented to surgical treatment, so the following day the beast was operated upon. An incision was made in the right flank sufficiently large to admit the hand and arm, and the cord constricting the gut was found and cut through with a curved, hook-bladed knife. The external wound was then sutured, and a broad bandage applied round the body. This was changed, and the wound re-dressed every other day until healing was well advanced. The bowels acted in less than an hour after the operation. The best of good, nutritious, and easily digested food was given, and an uninterrupted recovery followed.

CASE 2.—This subject was a black Welsh bullock, aged about 2. The symptoms shown closely resembled those described in Case 1. He had been noticed ill, with stoppage of the bowels for two and a half days, and freely dosed with Ol. Lini and Ol. Ricini.

We operated on the third day in the same manner as in the preceding case, and the patient made an uninterrupted recovery.

CASE 3.—This was a cross-bred bullock aged about 2. He had been treated by the owner for "stoppage," for three days prior to operation. The procedure adopted was the same as in Cases 1 and 2. The external wound was rather tedious in healing, but the patient ultimately made a complete recovery.

CASE 4.—This bullock had been noticed ill for four days, and had been very liberally dosed with oil and Epsom salts, and sundry Day, Son and Hewitt's drenches. We diagnosed "gut-tie," and commenced to operate. On opening into the abdomen, however, a considerable quantity of effusion was found in the peritoneal cavity. Slaughter was advised and adopted.

CASE 5.—This case was a Shorthorn bullock bred by the owner, and had been noticed ill for five days. Operation was commenced for relief of "gut-tie," but on opening into the abdomen ingesta was

found, the result of rupture of the bowel in front of the constricted portion. The animal was slaughtered at once.

Case 6.—This subject was a bullock, aged 2½ years, the property of a butcher. The animal had only been noticed ill during the day on the evening of which we were called in. The diagnosis was "gut-tie," and the condition was successfully relieved by operation on the following morning. This patient made an uninterrupted recovery, and more quickly than in those cases left ill for two or three days and drenched with purgatives before operation.

Case 7.—This beast was aged about 12 months. The owner lived some distance away from us, so he wrote us a long list of the animal's symptoms and the things administered to the beast, who had been ill and freely dosed for five days. From the description we suspected the condition, and went prepared to operate for "gut-tie." Examination of the patient confirmed our suspicion, but the animal was almost in a state of collapse. On opening into the abdomen we found ingesta free, and rupture of the bowel as in Case 5. The beast was slaughtered at once.

Case 8.—The subject was an Irish bullock, aged about 2 years. He had been ill for three days before we were called in. The symptoms were very similar to those described in Case 1, and "gut-tie" was diagnosed. We recommended operation, but as the bullock was in good condition the owner preferred to send him to the butcher rather than take the risks of operation. We confirmed our diagnosis on making a *post-mortem* examination at the slaughter-house.

Cases 9 and 10.—These cases resembled Case 8, and as each bullock was in good condition, the cases had a similar termination.

Case 11.—This case was a big Hereford bullock, aged nearly 3. He was found dead in a field, and on our being called in to make a *post-mortem* examination we found the cause of death to be "gut-tie."

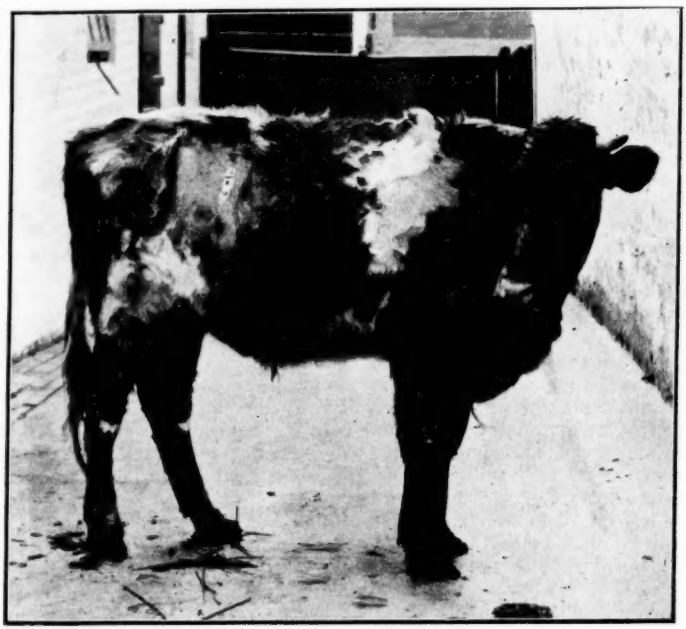
Case 12.—We were called in to see this bullock on March 14. He was out at grass with other bullocks, but was noticed dull and restless and not feeding with the rest at 7 a.m. The owner thought he had colic and sent for us. We arrived at 9 a.m. and found the bullock showing symptoms of abdominal pain, getting up and lying down at short intervals, and kicking at his belly. He passed a small piece of soft fæces, and after taking one or two steps backwards he stood for a minute or so, the right hind leg being further back and inclined behind the left hind leg. He was taken into a shed and we administered Ol. Lini. Oj. and Tinct. Opii. ʒij.

During the day the pain did not increase to any appreciable extent. At 12 noon his bowels acted very slightly, and this appeared to cause considerable uneasiness, and he backed against the wall, pressing his tail hard against it, and rubbing from side to side. From this time he did not pass any more fæces until after he was operated upon. About 8 p.m. he lifted his tail and the anus was dilated. On examining *per rectum* the constricted portion of bowel was felt when the arm was passed into the rectum well above the elbow. Between this hour and 9 a.m. he passed huge casts of mucus, which we found lying in the straw.

On the morning of the 15th the owner consented to have the bullock operated upon, and the operation was carried out as described in Case 1. Five and a half hours after the operation he passed a good

quantity of liquid fæces, again in one and a half hours, and again in three hours. He received no medicine after the operation until the 17th, when he became tympanitic. Brandy, ʒvj. and Tinct. Opii. ʒij. were then given in linseed tea. His food consisted of oats, bran, and chaff in small quantities, and linseed tea to drink. After the draught of the 17th, no other medicine was given. Care was taken in feeding for six days, and since then he has been allowed to eat as he wished. The operation wound healed by first intention, and we simply kept it dusted over with boracic pulv. We enclose a photograph of this bullock taken since the operation.

Case 13.—March 18, 1907. We were hurriedly summoned to attend a bullock, said to be in great pain. We diagnosed "gut-tie," and operated at once, but the bowel was already gangrenous, and as we found distinct traces of peritonitis, we thought the case hopeless, and had the patient shot.



Site of operation for "gut-tie."

With regard to the operation for this condition of so-called "gut-tie," or pelvic hernia, our method of procedure may be of interest:

The bullocks are operated upon in the standing position. A halter is put on and the head held fairly high by passing a rope through a ring in the wall. The left side of the animal is kept close to the wall by means of a pole fixed along the right side at a level with the stifle, and fixed securely to the wall in front and behind the beast. A strap

or rope is fixed round the hind legs above the hocks to prevent him kicking. Bullocks occasionally try to lie down, but by loosening the head a little, and the application of a stimulant by way of a whip smartly applied once is, as a rule, sufficient to keep them on their legs. No local anæsthetic has been used up to the present, but we intend to try codrenin at the next opportunity. The hair is clipped very closely, and the skin thoroughly washed with soap and water, then again with a liquid shampoo, and afterwards sponged thoroughly with a carbolic solution. The operator's hands are nailed and scrubbed, then soaked and rinsed in creolin solution, and again in chinosol. All the instruments are primarily boiled and placed in an enamelled tray in carbolic solution ready for use.

The incision is made high up in the right flank, and the skin should be cut smartly, this being the part of the operation where the greater sensation is shown. The wound is made sufficiently large to admit the hand and arm, and while exploring the abdominal cavity the operator has a clean piece of linen soaked in carbolic solution wrapped round the arm just above the elbow as an additional antiseptic precautionary measure. The strangulated portion of the bowel is, as a rule, easily found, and the cord constricting it feels to the fingers like a fibrous band—no doubt it is the peritoneal covering of the spermatic cord. It is rather tough to cut, and the instrument used for the purpose is a curved hook-bladed knife. The external wound is then sutured and a broad bandage applied round the body. This is changed and the wound dressed every second day until healing is well advanced.

We hope to make more detailed *post-mortem* examinations in the future in unsuccessful cases than we have done in the past, and to record a clearer account of the actual condition.

We have only met with cases in this neighbourhood. We have had experience either as pupils or as assistants in various parts of the country—in Lincolnshire, Hertfordshire, Essex, and Leicestershire—and in neither case have we seen it nor heard our principals speak of it.

A CASE OF STRYCHNINE POISONING.

BY GEORGE McCALL, M.R.C.V.S., VETERINARY COLLEGE, GLASGOW.

THE patient, a fox terrier, aged three years, was taken for a walk in the afternoon on the day of his mishap and returned at five o'clock. He then appeared in his usual health and ate two biscuits. At 6.15 he retired into a corner and was noticed shortly afterwards to be suffering apparently from fits. I saw him at 6.50, when he was lying on the floor with his legs stretched and rigid and his head bent backwards. The eyes were prominent and on the alert. He appeared perfectly conscious. Breathing was entirely abdominal. When touched he became as stiff as a board and gasped for breath. Chloroform inhalations were given until the seizure passed off, and then $\frac{1}{10}$ gr. apomorphine hypodermically. The emetic had the desired effect within three minutes, the dog vomiting a very large quantity of semi-digested food, in which portions of flesh could be seen.

The rigors were still coming on every few minutes, and at times breathing entirely ceased. After the dog had vomited, ⅛ gr. morphine hydrochloride was injected, but required to be repeated three times (a quarter of an hour elapsing between each dose) before the dog got relief. During this period the rigors came on less frequently, were less readily produced by sudden noise, &c., and ultimately ceased. The following morning the dog had completely recovered, and showed no signs of his recent serious illness. Since then he has been perfectly well. Four other dogs showing similar symptoms were brought to the College in the space of three days, also a dead dog. From a portion of the same flat on which the dog died, two others became ill and were pronounced to be suffering from strychnine poisoning by a neighbouring veterinary surgeon.

It is interesting to note that at least an hour had elapsed from the time the dog took the poison until the first symptoms appeared. This was probably due to the large quantity of food the stomach contained at that time. The origin of this rather serious outbreak may in all probability be ascribed to the injudicious use of vermin paste; still, there is the possibility that it was maliciously set for dogs to eat.

CRUSHING *v.* CASTRATION IN CEYLON.*

BY T. B. POHATH-KEHELPANALA.

PROTESTS are made by some Kandyans against buffalo castration, alleging that the new practice results in the premature death of the animal, and tends to degenerate their condition and endanger the agricultural industry of the country. The old form of "*crushing*," they urge, which they have practised from ages past, is the best and safest method. I believe that castration is preferable to crushing, in that it gives less pain to the animal, and is followed by a considerably speedier cure than in the case of the "crushed" animal. I disagree that castration causes early deaths, or that it undermines the strength of the animal.

In 1905, 1,518 head of cattle were operated upon by sixty-five trained men of the Veterinary Department. With the exception of a few fatalities, all the cases proved successful. The Society voted a sum of Rs. 1,500 for the surgical operations. But I confine my remarks to *buffaloes*, and among the number that underwent the operation, perhaps a large number of *black cattle* has been included.

I should think, however, that buffalo castration is detrimental to the Kandyan agriculturist in certain respects. Castration puts a dead stop to breeding, while the crushed animal is capable of generating, and thus the country will not run short of good stock. I am speaking of those buffaloes whose glands are not *entirely crushed*, but a small portion of whose glands is left unsqueezed. Buffaloes whose organs are entirely crushed are few and far between.

Again, the castrated animal greatly slackens his progress during levelling and ploughing the fields. The reason is not far to seek. In

* Abstract from the *Tropical Agriculturist and Magazine of the Ceylon Agricultural Society.*

the working of paddy fields, it is the general custom to urge the animal to move faster and to take the proper turns by the application of the *goad, more to the organs* than to the back. The testicles are very ticklish, naturally, and are sensible to the slightest touch, and buffaloes are never stirred to quicker work than by this process. What is left in the glands of the castrated animal is merely the bare skin. It is devoid of any sensitiveness. Apart from this, the continuous goading might injure the healed wound or even the abdomen of the castrated animal. The crushed animal has partially fleshy glands. Castration is decidedly effective for cart-bulls.

OBSTETRICS IN THE MARE.

BY ANTON TAPKEN, OFFICIAL VETERINARIAN AT VAREL.

From the *Monatshefte fur praktische Tierheilkunde*, vol. xviii., p. 148 (translated, with comments and two original illustrations).

BY W. L. WILLIAMS, PROFESSOR IN THE NEW YORK STATE VETERINARY COLLEGE, ITHACA, N.Y.

THE subject of Obstetrics in the mare has not been well described up to the present time. This is largely due to the fact that most agricultural practitioners have not had extensive experience in obstetrical operations upon mares. These are often only met with in those localities in which a considerable horse breeding industry is pursued. Such is the case in this community, in the Wesermarsh as well as in the contiguous territory. My territory borders upon the Wesermarsh, and I have met with from one or two to seven cases of dystokia annually.

For obstetrical work in the mare, I generally use the same appliances as in cattle (*vide* this Journal 1905, p. 127), finger knife, good cords or bands, Harms' eyehooks, Pflanz' embryotome or Perssons' chain-saw, to which also it is frequently desirable to add a long woollen blouse. While in the cow I prefer the chain saw, in the mare I preferably use the Pflanz' instrument, since although I use both for amputation of the posterior limb, either in or above the tarsus, the saw very readily becomes caught or bound.

In dystokia of the mare, the least possible delay should be permitted before giving help. A few minutes may make an essential difference in the sequel. The labour pains in the mare are generally so severe that perforations of the uterus or the vagina may occur very quickly, and all the more readily, if the animal lies down. It is, therefore, well to advise that the mare should be kept in a standing position pending the arrival of the veterinarian. When this cannot be attained by ordinary means, the mare should be walked about by an attendant.

It is essential to have a roomy place for obstetrical operations, in order that if the mare throws herself down suddenly the attendants can step out of the way readily. It may also be necessary to cast the patient. In many cases also it is necessary to take special precautions in regard to the safety of the operator. Many mares permit extensive

obstetrical operations without resistance, but others are very restless and may kick viciously. It is consequently best to hobble the hind feet of the mare in a way similar to that which is common by breeders at times of service. Place a long strap upon each hind fetlock, carry the ends of the straps between the forelegs and over the neck, and tie them in such a manner that they can be quickly undone; by this means the mare is prevented from kicking backward to any great degree.

In recumbent mares it is also necessary to take precautions. Mares in labour will roll unexpectedly, and strike out violently with their hind feet in a manner which endangers the obstetrician and his assistants. In order to prevent the rolling, I usually attach a strap to the upper hind pastern and secure it. Embryotomy is necessary in a comparatively large proportion of foals; out of fifty-seven cases of dystokia I performed embryotomy twenty-four times. The chief indications for embryotomy are a deviation of the head, breech presentation, hock presentation, vertical position (anterior presentation with the posterior limbs extended forward beneath the body in the pelvis), transverse presentation, and contractions. The removal of the anterior limbs and amputation in or above the hock are especially frequent.

The removal of an anterior limb is carried out in a similar way in the foal as in the calf. At first, with the mother in the standing position, an extensive longitudinal incision is made on the external surface of the limb from above downwards. The separation of the skin can be accomplished with the hand alone. If the head is completely retained there is generally plenty of room for operating, but it may happen that the foal is firmly pressed against the pelvic inlet, and little room exists for the hand and arm. The withdrawal of the limb is most readily brought about in the recumbent animal. It is usually essential to use the strength of four or five persons in tearing away a leg, in which respect it must be remembered that the Oldenburg horse is generally very large, and hence resistant.

Amputation in or above the hock can be carried out in various ways. If there is moderate room and the mare is quiet, the simplest and quickest method of amputation is with the Pflanz embryotome. The Persson chain-saw is not in my experience so well adapted for the operation, because it has a tendency to become locked in the joint, and it is seldom practical to apply it above or below the hock, and it is also more liable to cause lacerations of the genital canal than is the Pflanz instrument. This latter danger may be avoided by the use of the recently devised guard of Hauptner for the chain-saw. When the aforementioned instruments cannot be used on account of the restricted room or other conditions, the division of the Achilles tendon may answer the purpose. This operation can be done with the finger-knife, a probe-pointed bistoury, or with a strong pair of shears. Either before or after the division of the tendon, a thin, strong band should be placed on the leg above the hock. The latter is now drawn out sufficiently, so that it may be seen by holding apart the lips of the vulva, an operation which is not difficult, because the metatarsus and tibia lie directly against each other. The limb can then be easily amputated at the hock joint, and the second posterior limb is next treated in a similar manner.

The accompanying table gives an outline regarding the various

anomalies in dystokia occurring in one practice, which will be more fully dealt with below.

Chief Anomaly	Total Cases of Dystokia	Embryotomy	Without Embryotomy	Completed	Abandoned	Recovered	Died or Killed	Living Foals	Dead Foals
1. Feeble Labour Pains	2	...	2	2	...	2	...	2	...
2. Torsion of Uterus	1	1	...	1	...	1	...	...	1
3. Version of the Uterus (bi-cornual pregnancy ?)	4	3	1	2	2	...	4	...	4
4. Deviation of the Head	19	9	10	19	...	14	5	2	17
5. Deviation of the Anterior Limb ...	5	...	5	5	...	5	...	2	3
6. Croup or Breech Presentation ...	2	2	...	1	1	1	1	...	2
7. Hock Presentation	6	5	1	6	...	4	2	...	6
8. Vertical Position	2	2	...	2	...	...	2	...	2
9. Transverse Dorsal Presentation ...	1	1	...	...	1	...	1	...	1
10. Transverse Abdominal Presentation	2	2	...	2	...	1	1	...	2
11. Lateral Position, Dorsal Position ...	10	...	10	10	...	6	4	3	7
12. Contractions	3	1	2	3	...	2	1	1	2
Total...	57	26	31	53	4	36	21	10	47

Feeble Labour Pains.

This is comparatively infrequent in mares. I have diagnosed it twice. An aged mare, a pluripara, after the normal duration of pregnancy, had shown signs of parturition, such as unrest and feeble pains, for some hours. Upon examination the genital canal was ordinarily dilated, the live foal was presented normally, the head and anterior limbs already advanced in the pelvis. The foal was easily drawn away with the mother in the standing position. In a second case the foal presented posteriorly; this also was easily delivered alive.

Version of the Uterus.

At times there occurs a dystokia, caused by an anomaly of the uterus, which in our literature has not been described at all. There are more or less labour pains, while nothing of the foal is in sight. By manual exploration the hand does not at first come in contact with the fœtus but only with mucosa, and it is difficult to determine whether this belongs to the uterine wall or to the fœtal membranes. It is only after a more careful exploration with the hand inserted as far as possible that we discover an abnormal bending, a flexion, or perhaps an invagination, of the uterus. One feels one or several tightly stretched transverse folds, so that it suggests a similarity to torsion of the uterus; in the latter, however, the folds are found much further back in the vagina. Beyond the folds of the flexed uterine wall the hand can generally come in direct contact with some portion the fœtus. There can also be felt portions of the fœtus through the uterine walls lying in the recurved portion before the pelvic inlet, or even in the pelvis.

Delivery is always very difficult. If no part of the fœtus can be reached, then delivery is evidently impossible. In each of the four cases which I append, the result was fatal for both the mother and foal, and such was also the result in another case which, owing to oversight, was not included in the foregoing table. In the latter case of dystokia two experienced colleagues had already tried in vain to deliver the mare before I had been called. It was barely possible to touch the metacarpus of one leg with the finger tips when the arm had been introduced completely to the shoulder.

Case 1.—An old mare, which had foaled regularly a number of times, showed, after the normal duration of pregnancy, symptoms of colic in the evening. Mild labour pains appeared, and now and then some of the fœtal waters were discharged. The mare was walked about pending the arrival of veterinary help. Upon examination, at 8.30 a.m., the mare was quite comfortable; and she ate with evident appetite. No labour pains were visible, but at times there was a discharge of fœtid fluids. The *cervix uteri* was found completely dilated, and portions of the ruptured chorion extended into the vagina. The uterine walls were stretched and were thrown into folds similar to torsion of the uterus, but these folds were nearer to the body of the uterus. The fœtus could be barely reached with the finger tips after the arm had been introduced up to the shoulder. During the exploration there were only feeble labour pains.

An attempt to modify the position of the uterus by rolling the mare produced negative results. While in the recumbent position, however, strong labour pains appeared, and, as a consequence of these violent pains, the tightly-stretched uterine wall was pressed into the pelvis to such an extent as to threaten rupture. The neck of the bladder was also dilated to such a degree that four fingers could be introduced into it. During the violent pains the urinary bladder was from time to time forced out into the vulva, where it was visible as a whitish mass about the size of a man's fist.

In order to avoid the sole responsibility to the owner of an unfavourable outcome, I requested him to call a second veterinarian in consultation. At 4 p.m. the further handling of the case was undertaken in company with my colleague, "K." In the meantime the conditions had not changed. After a prolonged effort we were finally able to grasp the lower end of the tibia and attach a cord above the hock. This was the portion of the foal which we had succeeded in touching during the morning. By means of a vigorous pull by four persons, the tarsus was brought to the pelvic inlet, and the *tendo-Achillis* divided partly with a knife and partly with scissors, and then both arms were inserted in the genital canal, and finally the leg was drawn out so far that it could be amputated in the hock. The second leg could not be grasped. There was consequently nothing left to be done but to apply traction to the tibia of the amputated leg. With powerful traction by six persons, the skin and muscles tore asunder without any incisions having been made; the leg tore away at the hip joint and was drawn out; then the second tarsus could be grasped. It was handled the same as the other limb. Upon the application of powerful traction by six persons the fœtus was extracted; it was large but normally formed. In the uterus, near the neck, there existed a perforation. The mare died a few hours after parturition.

Case 2.—An eight-year-old mare, which had already foaled in a normal manner repeatedly, showed, after eleven months pregnancy, light labour pains and unrest for a period of two and one-half hours. An internal examination revealed one foreleg presented in the normal position and direction in the pelvis. Over the advanced limb the uterus and vagina formed a projection inside of which one could distinguish parts of the fœtus, especially the head. These parts were time and again forced to the middle of the pelvic cavity during the labour pains. Beneath the presented foreleg one could feel through the uterine wall other parts of the foal, which later were found to be the second anterior limb flexed at the carpus.

After mounting a stool so that I could insert the arm as far as possible, I succeeded in reaching with the hand the point of flexure of the uterus. It was not possible, however, to grasp any other part of the fœtus. The anterior limb was now corded and drawn out by three persons until the forearm was visible. It was now possible to release the other anterior limb from the fold in the uterus and bring it into the genital canal, but it could not be extended. In order to secure room the extended limb was detached. The separation of the skin was incomplete, and could only be extended to the elbow-joint. As a result of this it required the combined power of six or seven persons to draw the limb away. The head, which was clearly recognisable at the beginning of the operation, became displaced in such a way that it could no longer be reached. There remained, consequently, no other recourse than a forcible extraction of the fœtus, which was accomplished by the traction of six or seven persons. The mare lay exhausted and listless, and could not be induced to stand. After half an hour the pulse was 60 per minute, strong, regular, which indicated that no great amount of internal hæmorrhage was occurring. A small amount of blood flowed from the vulva. By a manual exploration of the uterus in the recumbent position, no labour pains were induced. After three and one-half hours, the mare arose, staggered somewhat at first, but soon partook of food. In the following days the appetite was fairly good, but then failed. The pulse was 60 per minute.

Four days after parturition the mare was again examined by me. The pulse was 70, the appetite poor, and now and again there were expulsive efforts. Upon examination of the parts there was found a great gaping rent in the superior wall of the uterus, so that it was easy to introduce the hand directly into the peritoneal cavity. The animal died suddenly on the sixth day, almost without a struggle. The autopsy revealed a rent in the uterus about 25 cm. long, and diffuse peritonitis.

Case 3.—A young mare at full term had shown labour pains for several hours. Fœtal waters had appeared. Upon inserting the hand as far as possible only fœtal membranes and the uterine wall could be felt; through these walls, however, in the reflexed uterus, parts of the fœtus could be recognised. An empiric, who with the consent of the owner had made an examination, had torn a hole in the wall of the uterus, which he had mistaken for the fœtal membranes. The mare was thereupon destroyed.

[*Translator's note.*—Tapken has apparently not seen our article, entitled "Transverse Development of the Fœtus in the Uterus," which

appeared in the *American Veterinary Review*, vol. xiii., p. 298. It is highly interesting to note closely the parallel experience of Tapken with our own. The interpretation placed upon the peculiar conditions does not correspond. The symptoms, obstacles to delivery and results are essentially identical. This condition, so far as we know, has not been described by other writers, although, judging from the experience of Tapken and ourselves, it would seem that it must be met with frequently in obstetrics in the mare, but is virtually unseen in other domestic animals. In our article we interpreted the condition to mean a transverse or bi-cornual development of the fœtus in the uterus and a consequent displacement of it. In our four cases, like those of

FIG. 1.—Transverse or bi-cornual development of the fœtus in the uterus of a mare. V, Vagina; U, uterus; UC, uterine Cornua with fœtus in the first stages of development.

Tapken, the labour pains were very light, and there seemed to be no progress made toward expulsion of the fœtus. In our description we emphasised the extremely long and narrow genital passage. Unlike in normal pregnancy, this genital canal consisted of the vulva, vagina, and the body of the uterus, the entire passage up to the point of divergence of the uterine cornua being converted into one uniformly narrow canal with a complete effacement of the *os* and *cervix uteri*. While Tapken does not emphasise this elongation directly he makes it evident that such was the case from the fact that he could barely reach some portions of the fœtal body with his finger tips. By

referring to fig. 1 our interpretation of the beginning of the anomaly will become apparent. The uterine cornua, U C, in the soliped, unlike that of any other domestic animal, leave the body of the uterus at right angles, or somewhat recurved, making it possible for the fœtus to develop in a transverse position, occupying the two cornua more or less equally, and leaving the uterine body, U, entirely vacant. Since the embryo tends to curve ventrally, it would be most likely to form with its vental surface presented towards the uterine body, and might remain in such a position until considerable size had been attained, when the maternal pelvis and other surrounding parts would no longer permit of the position remaining stable. The instability of the

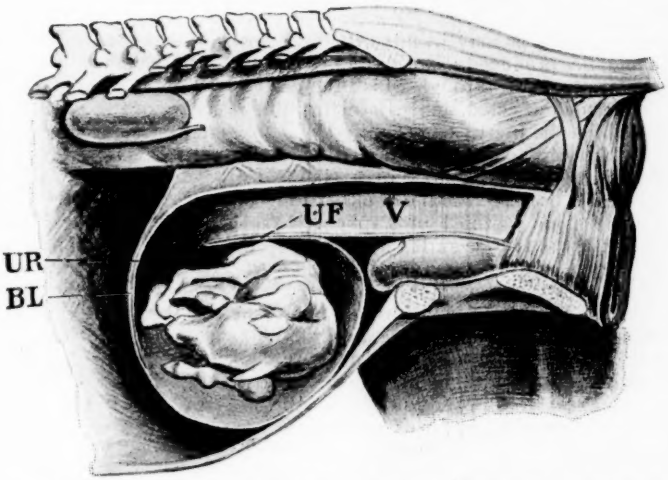


FIG 2.—Transverse or bi-cornual development of fœtus in a mare. Final stage after the fœtus has revolved 180° on its long axis and come to rest in a stable position. V, Vagina, including the uterine body in one elongated canal; UF, the original floor of the cornua, now become the roof and lying in contact with utero-vaginal passage; UR, the original superior wall of the cornua, now become its anterior portion; BL, broad ligament of the uterus dragged downwards in the displacement.

position, as development goes on, would tend to cause the dorsal portion of the fœtus to sink downwards upon the abdominal floor, in which case it would still remain unstable and tend to turn upon its side with the ventral portion of the body presenting towards the head of the mother. We then obtain the position shown in fig. 2, where the fœtus is lying with its dorsum towards the pelvis of the mother and the extremities extending more or less forward, while the main volume of the fœtus rests beneath the vagina, V, in such a way that it can clearly be felt beneath the floor of the vagina, or genital passage, which consists of vagina and uterine body combined. By this revolving of the fœtus upon its long axis the uterine cornua are carried along with it in such a way that the original floor now becomes the roof, U F, while the original roof, or superior wall, U R, now becomes the anterior wall of the cavity.

Our interpretation of the anomaly, as related in the article which we have mentioned, has been fully verified by *post-mortem* findings. We had the privilege of making an autopsy in one of our cases in which the fœtus lay clearly in the two cornua in approximately the position which we have indicated in our fig. 2. It therefore seems to us that our interpretation is founded upon indisputable evidence. Up to the time of this autopsy, we had attended three other cases, without having been able to properly interpret the condition. Our fig. 2 illustrates very well the enormous, if not insuperable, obstacles to delivery. It will readily be seen that it may be impossible to secure any part of the fœtus upon which the obstetrist can exert traction or other power. If he be so fortunate as to reach any part of the body, it is evidently one of the limbs, or possibly the head, and, as Tapken has recorded, even this cannot be directly extended in the vagina. Severe traction upon these extremities may eventually bring away the fœtus, but almost unavoidably produces a fatal injury to the mother through a tearing of the projecting wall through which the dotted line, U F, passes. Even if delivery is affected, and a fatal rupture is avoided, the anomalous form which the uterus has acquired will prevent drainage, and almost inevitably lead to a fatal termination. A study of this figure, if our interpretation be accepted, may well explain why Tapken failed in each case to preserve the life of either the fœtus or mother. Our results were the same as those of Tapken. We thus have here a record of nine cases, the four recorded by us and the five by him, without saving the life of a foal or a mare. So far as we are aware, these are the only cases of this character on record. We found in one of our cases that casting the mare, and turning her upon her back with the head inclined downward, tended to bring the foal more within our reach, but in our last case even this failed, and the delivery had to be abandoned. It seems to us that such an obstacle as is here presented is practically insurmountable. The only possibility that we can see is hysterectomy, an operation which, so far as we are aware, has not proven successful in the mare. It is not likely that the obstetrist would meet with an opportunity for saving the life of the foal. Should he do so, it seems to us clear that he should sacrifice the life of the mother and liberate the fœtus at once by hysterectomy.]

Torsion of the Uterus.

Owing to the fact that among fifty-seven cases of difficult labour (and some others during the first years of my experience) only one case of torsion of the uterus occurred, it would appear that this anomaly is very rare. Among my colleagues also in the Oldenburg Weser-marchen, who have an extensive experience in obstetrics among mares, there can be related altogether only two or three cases occurring in the practice of Oldenburg veterinarians. Torsion of the uterus is very difficult to handle in the mare, and the termination is very frequently fatal to the mother. That the mare may, however, show great power of resistance in cases of torsion is well demonstrated by the following case observed by me.

Case.—A ten-year-old mare, which had been pregnant for eleven months, had for three or four weeks frequently shown slight attacks of colic, and one of these was of considerable severity, and lasted several hours. The appetite during this period remained comparatively good.

Fæces of normal character were voided frequently, but in small quantity. The udder had gradually become enlarged. Four days previous to our examination milk had escaped spontaneously, and then the udder had diminished in size, and the flow of milk had ceased. During this latter period no movements of the foal were observed. My assistant, Mr. Wollert, examined the animal on the morning of April 30, and diagnosed torsion of the uterus. By placing his hand far into the rectum he felt a firmly stretched cord, which pressed the intestine to one side and compressed it. The rectum was dilated and filled with fæcal masses anterior to this compression. The vulva was normal. The folds in the vagina and uterus showed clearly the presence of torsion. The pulse was 60 per minute. The temperature 38° C. It was necessary to have additional help, and my arrival was awaited, which occurred at 6.30 p.m. The delivery was then conducted by W. and myself. The condition of the mare, which was quite comfortable, was as yet unchanged. By the insertion of the hand it was found that the floor of the vagina was pushed up and the neck of the bladder was so dilated that a small hand could be passed completely into it. Although the spiral winding of the uterus could be readily passed, there was at first no part of the foal within reach.

The animal was now taken to a roomy place covered with a thick layer of straw, cast, and a trial made at turning her. By rolling her to the left the torsion was increased, while by turning her to the right it was diminished. It was necessary to turn the animal completely over three times before the twist was obliterated. The rolling of the animal was easier than expected, so that it was not necessary to use a very great number of persons in the operation. After rupturing the fœtal membranes the two carpal articulations and the head could be reached. The animal was made to stand and the anterior limbs were carefully extended; it was quite difficult to disengage the legs from the folds in the uterus. The head was deviated to the side, and the application of traction to the fore legs failed to advance it. Each of the fore legs was removed subcutaneously. The separation of the skin was incomplete because of the limited room for work. In order to tear out the legs it was necessary to use the force of ten persons, but they did not exert their full strength. An attempt to fasten a loop upon the lower jaw failed. We then inserted one Harms' eyehook into an orbit (a second hook was not at hand) and the head was then advanced to such an extent that a loop could be placed over the poll and through the mouth (the so-called Polish twitch), and by this means the foal was slowly extracted with the aid of two persons. At the beginning of the operation the foal made no movements, it had apparently been dead three or four days. Decomposition had not set in, however.

The mare got up immediately after delivery and took food with a relish. The afterbirth was readily detached and taken away. No wounds could be discovered. After a few days the mare was again put to light work.

[*Translator's Note.*—The rarity of torsion of the uterus in the mare, as related by Tapken, is entirely in harmony with our personal experience. In a large obstetric practice of twelve years, with many cases of dystokia in the mare we observed but one instance. This one had gone beyond the possibility of help, and the mare was in a practically dying condition when we reached her. The torsion was

more complete than in the case related by Tapken, and the *os uteri* could not be reached. The fœtus was badly decomposed, emphysematous, about three times its normal size, while the uterus was enormously distended with exudates and was gangrenous.

The difficulty which Tapken relates of securing a cord upon the lower jaw of a fœtus, seems to be a common experience with veterinary obstetrists. There is, however, a simple method by which a cord can be applied with security. If one will take a finger knife or other cutting instrument, and make an incision between the two rami of the lower jaw up into the mouth, then pass a looped cord over the jaw, push it up beyond the incision, and next pass the free end of the cord through the incision from the mouth downward, the loop cannot slip off the jaw. By this method the rami of the jaw are pressed together so that they cannot be broken apart, and almost any amount of traction can be applied without any danger of slipping or tearing out. Even in a living fœtus, the wound is of such a character as to be of little consequence. This scheme affords one of the best and most secure methods of traction which can be applied to the head.]

Deviation of the Head.

One-third of the cases of dystokia were due wholly or chiefly to a deviation of the head. As a general rule the head was turned to the side, especially if contraction of the neck existed at the same time, so that the face of the foal was directed toward its posterior extremity. Sometimes the head, with the mouth, was located against the pelvis, in which case there was usually a lateral deviation, or there existed at the same time an incomplete extension of the neck. In the so-called poll presentation, the face looks downward or backward, the head is presented by the poll and generally lies upon the anterior limbs in the pelvis. Sometimes the deviation of the head is accompanied by an abnormal position of the fore legs or by other deviations. The cause of the abnormal position is not always clear. In the lateral deviation there is very frequently a contraction of the neck, and this may cause the abnormal position. The poll presentation is especially liable to occur in premature births, there having been among six instances of this anomaly three cases of premature birth, while of the latter only four instances are included among the fifty-seven cases of dystokia.

The handling varies according to the position of the head. When the head is deviated to the side or the poll is presented, the correction of the position is uniformly very difficult. It is especially difficult to bring the head into the pelvis when the nasal portion of it is engaged against the pelvic border. A noose upon the lower jaw does not remain in position (compare translator's comments under "Torsion of the Uterus"); one can better rely upon the aid of the small Harms' hooks, inserted in the orbits. But here only a moderate traction is permissible, since the bones of the head of foals are not so resistant as those of the calf. If it should be necessary to apply a greater traction to the head, it is essential to apply the noose over the poll and through the mouth as early as possible. When the deviation of the head cannot be corrected, it is necessary to either undertake embryotomy or to draw the fœtus away by force without correcting the position. In the early years of my practice I was in the habit of resorting to embryotomy, consisting of the amputation of the fore leg opposite to

the side upon which the head lay, because more room was afforded thereby. By the removal of one fore leg the diameter of the chest was decreased, so that the extraction of the foal could be brought about by drawing upon the remaining anterior limb. The head of the foal, lying in the region of the flank, tended to produce only a slight obstacle to birth. In my experience, however, the fœtus was sometimes extracted before the limb was completely removed, which is very unfortunate if the foal still lives. This once occurred to me. On this account I have for a long time aimed to forcibly extract the foal when the head is completely retained. This operation usually succeeds, but required the combined powers of four or five persons for its accomplishment. If I find the head close to the pelvic inlet I shove it back as far as possible, and then apply traction carefully and moderately in order to cause the head to be gradually turned backwards, and assume a position by which it may pass through the inlet. But the head can be in such a position that it cannot be brought into the desired place, and embryotomy becomes necessary. In such cases one fore leg is removed, then the other if necessary, and finally the head is secured by means of a loop upon the jaw or through the mouth, and over the poll or with the eyehooks, and the foal removed by traction. When the poll is presented and the deviation cannot be corrected, the fœtus is at once removed by forcible extraction if both fore feet are regularly presented and the head is resting upon them. This has succeeded with me not only in case of small but also in large foals, and the result for the mother has been favourable in each case. In two cases I have had the privilege of observing fully matured foals, in which the poll was presented, born without assistance.

Case 1.—A seven-year-old mare showed labour pains after the normal period of pregnancy. The hoofs of both anterior limbs were visible; the head lay completely to the side so that it could not be reached though the arm was inserted to the shoulder. The foal was alive. The mare lay down frequently but sprang up again immediately; she was consequently cast. With the combined strength of four persons the foal was extracted; in the meantime it had died. The head and neck were contracted. The mare recovered.

Case 2. — A large four-year-old mare, eleven months pregnant, had been in labour for five hours. She was first attended by an empiric who found the two anterior feet engaged in the vaginal wall, and had drawn them out until the hoofs were visible beyond the vulva. The foal was lying on its side with the head against the pelvic border. The head could not be brought into the pelvis by means of a cord on the lower jaw because it would not hold fast. Only after both forelegs had been removed, for which purpose the power of three or four persons was necessary, could the head be brought into the passage by means of small hooks inserted in the orbits, and the birth thereby completed. The mare recovered but did not become pregnant the next year.

Case 3.—A five-year-old mare had been in labour for three hours after having completed the normal duration of pregnancy. The anterior feet were in sight and two persons had drawn upon them without result. The head of the live foal was found in front of the pelvis with the muzzle directed against it. It was impossible to bring the head into the pelvis. Attempts to repel the legs and thereby bring the head into the passage also failed, because the mare at this time strained

violently. Three persons then pulled upon the anterior limbs cautiously and at the same time the head was pushed backward. As the traction continued the head turned completely backward and the foal was readily extracted by three persons; in the meantime it had died. The mare recovered.

Case 4.—A young mare had been in labour for two hours. The anterior limbs of the foal projected through the vulva as far as the middle of the metacarpus; the head was lodged against the pubic brim, the poll being presented. Attempted correction of the deviation failed: the lower jaw could not be brought over the brim of the pubis. As the foal was alive and the owner was very anxious to preserve it (the mare was also quite valuable but insured) it was attempted to extract it in the poll presentation. After the mare had lain down, four men drew strongly upon the limbs and brought the foal away. Even when the foal had been advanced as far as the hips it was necessary to exert considerable traction in order to complete the delivery. The foal was dead. While the mare eventually recovered she suffered for a long time from vaginal catarrh, and did not become pregnant at the next breeding season.

Case 5.—A mare had shown labour pains for two and a half hours. The living foal showed poll presentation, and correction of the deviation was impossible because of the violent straining. The foal was promptly delivered by forcible extraction; both the mother and foal surviving.

Case 6.—A mare which was eight and a quarter months pregnant had been in labour for five hours, the poll being presented while the anterior limbs were retained at the carpus. Reposition and extraction were easy.

Case 7.—A mare which had been pregnant for ten and a half months was found early in the morning cast against the manger. There projected from the vulva a bloody looking mass of fœtal membranes. The mare was helped up and I was then called. Upon examination the open *cervix uteri* was found pressed out through the vulva; also a portion of the fœtal membranes were visible. The foal lay with its poll presented at the pelvic inlet, one foreleg was flexed at the carpus, the other was not at first distinguishable. The head and anterior limb were with difficulty brought into a normal position in the pelvis and the foal was readily advanced until the head was about half way out of the vulva, further progress was then blocked. It was then found that the second foreleg was not completely retained as I had supposed, but was flexed at the carpus and caught against the lower margin of the pelvic inlet. A correction of the deviation could not be made. The foal was drawn away by four persons. After this, for the first, the partially prolapsed uterus could be returned. Although no injury could be discovered the mare died a few hours after delivery.

Abnormal Position of the Anterior Limbs.

This anomaly, when it is not complicated with other deviations, can usually be corrected without great labour, or forced extraction can take place without adjustment. In two cases I met with the flexed carpus advanced in the pelvis. It would have been difficult to repel the fœtus and correct the position. In each case the foal was cautiously drawn out without correcting the deviation, the carpus being guarded by the inserted hand so as to avoid injury to the vagina. Both foals were born alive. In one case where the anterior limbs were crossed

over the neck the hoofs were already visible outside the vulva. Traction exerted by three persons brought the dead foal away without the position having been corrected.

Dystokia due to Flexure of the Posterior Limbs.

This anomaly occurs comparatively frequently in premature births. In three out of six cases observed by me, however, it occurred in mature living foals. The correction of the deviation tends to be more difficult because of the length of the limbs of the foal and the straining of the mother. In my experience I have succeeded only once, in a premature birth, and in which case decomposition of the fœtus had taken place. In the five other cases embryotomy was necessary.

Case 1.—A mare in the tenth month of pregnancy, which had repeatedly foaled normally but had aborted in the preceding year, had suffered from frequent attacks of colic for several days. There had been a flow of milk for some two days and violent labour pains for two hours. Upon exploration the fœtal pelvis and hind limbs flexed at the hock were found impacted in the maternal pelvis. As I drew vigorously upon one hind leg the fœtus suddenly came away completely. It was quite small and already decomposed. As a consequence the parts were soft and flaccid.

Case 2.—The following year the same mare suffered from dystokia and the presentation was again posterior with retention of the feet. In this case, however, the normal duration of pregnancy had been reached. The deviation could not be corrected. I therefore undertook to use the Pflanz embryotome which I had just procured and had not used. A small cord was passed around the most available hock, then the chain of the instrument, and after this the cutting chain drawn in place. In itself this was easy, since the standing animal was quiet and strained only moderately. With all my precautions, however, I failed to prevent the very sharp cutting chain from now and then coming in contact with the vaginal mucous membrane, especially at those times when the straining of the mare brought the upper and lower vaginal walls in contact. The amputation was easily accomplished immediately below the tarsus. The other hind leg was amputated in a similar manner just above the hock. The amputated feet were readily withdrawn by the hand; the mare was very quiet during the operation. The foal was readily drawn out by the hind limbs. The mare recovered.

Case 3.—An empiric had tried in vain for two hours to deliver a foal in which both feet were retained at the hocks. After severing the *tendo-Achillis* with a finger-knife, birth occurred without difficulty; the Pflanz embryotome and the chain saw were not at hand. The mare died fourteen days later.

Case 4.—A foal was found with double hock presentation. The Persson chain saw could not be applied for want of room, the Pflanz embryotome was not at hand; whether the latter could have been applied was questionable. The *tendo-Achillis* was divided as in the previous case and the foal drawn away. The mare died a few hours later from hæmorrhage.

Breech Presentation.

Posterior Presentation with the Hind Limbs completely Retained.—The correction of this deviation is quite as difficult as that of the

hock presentation; in the two cases which I have handled I have failed to bring about reposition in either instance. Only very small fœtuses can be extracted with the aid of the Weimann or Saake loop. When the fœtus is wholly anterior to the pelvis, as was the case in the two following instances, the loop cannot be applied. It is therefore desirable to convert it into a hock presentation and then proceed as above.

Case 1.—A fully matured foal was found in breech presentation. With great difficulty the owner had advanced one leg sufficiently that he had converted it into a hock presentation. The foot was then amputated with the Pflanz embryotome about the middle of the joint. The second posterior limb was extended completely forward out of reach. The foal was forcibly removed by traction exerted upon the amputated leg by three persons. The mare recovered.

Case 2.—A fully developed foal was found in breech presentation lying upon its side. One leg was brought into the hock position and amputated just above the tarsus with a Persson chain saw. In order to avoid injury to the mare from the saw a strong leather sheath was slipped over each end of the chain. The second posterior limb could not be reached. It was then attempted to draw the fœtus out by the extended leg. Finally, when six persons had exerted their whole strength, the leg with the skin and muscles was torn out at the hip-joint. After this a small part of the pelvis was torn loose after much labour. The operation was abandoned and the mare destroyed.

Vertical Position.

Anterior Presentation with the Two Posterior Limbs Extended Forward Beneath the Fœtal Body.—This anomaly I have observed twice. In one case the anterior part of the foal had already been drawn out, but the posterior portion, in spite of powerful traction, could not be released. Examination revealed the hoofs of the posterior feet of the foal extended beneath the abdomen within the pelvis. The fœtus was bisected, the stump repelled, and the remnant easily withdrawn by the hind legs. In a second case the mare was found lying in the pasture, the anterior portion of the foal extruding. She was handled the same as the first mare. Both mares died one or two days after delivery, apparently as a consequence of the long impaction of the half-born fœtus in the genital canal.

Transverse Dorsal Presentation.

I have had the fortune to meet with this position once. An empiric had first attempted in vain to complete the delivery. The foal lay with its back directly against the pelvic inlet. Head and limbs could not be reached. The fœtus could not be repelled nor its position changed. It was now sought to bisect the foal by cutting through the spinal column with the Pflanz embryotome, and then to remove a portion of the abdominal viscera. Although this operation would seem easy, it was found very difficult under the above conditions. The mare would not stand for the obstetrical manipulations, and in the recumbent position she strained so violently as to cause a prolapse of the rectum. As a result of this I was obliged to keep one hand in the rectum to hold the prolapse back while I worked in the genital canal with the other. An assistant could not aid because he was in my way. The delivery could not be completed.

Ventral Transverse Presentation.

The relations are more favourable here than in the dorsal presentation because portions of the foal can be grasped and secured. However, in the two cases of this anomaly which I observed the delivery was very difficult.

Case 1.—A five-year-old mare which had reached the normal duration of pregnancy. The owner, who was very observant, had noted for several days that the motions of the foal were not, as usual, in front of the udder, but in the right flank region. For five hours powerful straining, uneasiness and other symptoms of parturition had been present. Exploration revealed an abdominal presentation. Both anterior limbs were extended with the hoofs in the middle of the pelvis, the posterior limbs were presented by the hocks; the head could not be felt. Wishing to convert the foal into a posterior presentation, the anterior limbs were repelled as far as possible. A reposition of the hind legs could not be brought about; the Pflanz embryotome and the chain saw were not at hand. One after another the *tendo-Achillis* of each leg was cut through, the foot amputated, the thighs advanced in the pelvis and the foal withdrawn by three persons. The operation was unusually difficult because of the restlessness of the mare, the contractions and folding of the uterus, as well as the constantly increasing swelling of the vaginal walls. The operation could not be carried out on the standing animal because she constantly kicked violently, and when the two hind legs were hobbled she constantly moved back and forth. During parturition a hæmatoma had formed in the vagina which indicated an unimportant hæmorrhage. Serious injuries, however, could not be found in the vagina or uterus. The mare died a few hours after parturition.

Case 2.—The four limbs of the foal were presenting in the pelvis. Both anterior limbs were amputated subcutaneously; the foal was then extracted by traction upon the hind legs. The mare recovered.

Lateral Position; Dorsal Position.

These abnormal positions are met with chiefly in the posterior presentation. They offer no very difficult problem to the obstetrician. Of ten cases of this character four died. For this reason the following cases are appended:—

Case 1.—In a seven-year-old mare, which had shown signs of parturition for two hours, the foal was found lying upon its side in the posterior presentation. The feet were advanced in the pelvis. After the mare had lain down, light traction was applied to the legs; the mare sprang up immediately, and the feet, which were already visible, disappeared in the passage under violent movements. The mare immediately lay down again. The foal had now acquired a normal position, and one man was able to withdraw it. The mare recovered, the foal died immediately after birth.

Case 2.—An old mare had been in labour for two hours. The foal was in the lateral position, posterior presentation. The feet were secured and the fœtus turned somewhat. The posterior portion of the foal was easily withdrawn while the animal lay, but the anterior portion was only extracted by the combined strength of five or six

persons. The sternum of the foal had been displaced to one side and the ribs of one side were pressed in as a result of the great pressure upon the chest during its passage through the maternal pelvis. Although no injuries to the mare could be discovered, I later learned that she died fourteen days after parturition.

Case 3.—In a mare which had reached the normal duration of pregnancy the foal was in the posterior presentation and lateral position. The hoofs were pushed against the roof of the pelvis; they were secured and while the mother stood the foal was withdrawn by three persons. No injury to the mother could be found, but the uterus contained considerable blood clots. The mare died ten hours after parturition, apparently from hæmorrhage.

Case 4.—A mare eleven months pregnant had been in labour several hours. The foal was in the dorsal position and posterior presentation. The hind legs were secured, moderate traction applied, and the foal turned on its long axis. The extraction of the anterior portion of the foal required the power of five or six persons. The fœtus was already decomposing, and emphysematous. The hair on the posterior surface on both elbows was rubbed off, which indicated that these parts had offered the greatest resistance in passing through the pelvis. The mare recovered.

Case 5.—An old mare had shown severe straining for several hours. Upon examination the small intestine of the mother was found protruding through the vagina for a distance of six to nine feet. The fœtus rested in the lateral position, posterior presentation. It was easily extracted, but was already dead. The mare perished half an hour later.

Contractions.

Contractions involve chiefly the neck. We have spoken of this anomaly under deviation of the head. Contractions of the limbs also occur combined with more or less rigidity, either independent or associated with contractions of the neck. Such anomalies, according to their degree, cause at one time a mild obstacle, at another very severe, which can only be overcome by embryotomy.

Case 1.—A mare showed violent pains, but no portion of the fœtus appeared. The hoofs of both fore feet were lodged against the upper border of the pelvis. They were easily brought into the passage so that birth could take place. Both pasterns of the anterior limbs were at right angles with the metacarpus, so that when the fœtus tried to stand the ends of the canon bones rested upon the ground. The foal was destroyed.

Case 2.—Both fore legs of a foal had entered the pelvis in a lateral position. The head lay so far back that it could barely be felt by the hand. Near the head one could recognise a tarsus. Even after the amputation of both fore legs the head could not be extended. The hock was secured by a loop and brought into the pelvis. An attempt to amputate the leg with the Persson chain saw failed, as the saw became caught in the joint and could not be applied elsewhere; the Pflanz embryotome was not at hand. The *tendo-Achillis* was divided and the leg brought into the passage. The other hind leg could not be reached, a further embryotomy appeared impossible, and consequently it was attempted to draw the foal out by traction on the one

hind leg. This occurred by the combined power of six persons. It resulted in a perforation of the uterus which caused the death of the mare twenty minutes later from hæmorrhage. The second hind leg of the foal was directed straight forward and so stiff that it could not be extended backward. The neck was also contracted.

Aside from the cases here described there are many other forms of anomalies. Though some speak of excessive size of the foal, I have not seen a case in the mare where the oversize of the fœtus constituted the chief cause of dystokia. In the foregoing cases it is to be noted that extreme traction was necessary in some instances to bring away the anterior portion of the foal when presented posteriorly, which might be taken to indicate an excessive size of the chest. It is to be assumed, however, that the foals would have been born without, or with very little help, if other conditions had not rendered the birth difficult.

Diseases and Anomalies which occur During or Following Birth.

Dystokia in the mare is highly fatal. Wollesen lost 36·36 per cent. (eight of twenty-two mares), and I have lost even as many, 36·71 per (cent. twenty-one among fifty-seven mares). Of the cases handled by me delivery could not be completed in four instances, although in one, three veterinarians participated. In some cases, in my judgment, the mother was already mortally injured, and extraction of the foal was carried out in the hope of saving it. In other cases the mare had already perished before my arrival.

Compared with this direct mortality in dystokia in the mare, diseases and anomalies after birth are not nearly so common nor of so great a variety in the mare as in the cow. I shall here only relate those concerning which I have made immediate observations.

Rupture of the Uterus or the Vagina with Fatal Hæmorrhage.

Rupture or perforation of the uterus or the vagina is not rare in the mare. A so-called spontaneous rupture may occur in cases of malpresentation of the fœtus with violent straining. The injury can proceed direct from the fœtus or indirectly as in the vagina by first causing a hæmatoma, which may later rupture, especially when the mare lies down and the straining becomes more violent, or when she throws herself down violently. The rupture may also be caused through obstetrical manipulations, especially in embryotomy or the forcible extraction of the fœtus. In many cases powerful traction may be withstood with impunity, while in other instances very moderate force causes a rupture. The danger largely depends upon the position of the fœtus, whether one or another part of it exerts powerful pressure upon a limited area of the uterus or vagina. Also portions of the fœtus may become entangled in folds of the uterus. In many cases rupture occurs in an entirely unexpected manner.

Extensive uterine or vaginal injuries usually lead to a fatal termination as early as half-an-hour or later after the accident. There appears then difficult respiration, rapid weak, or imperceptible pulse, blanching of the visible mucous membranes, staggering,

until finally the animal falls and succumbs after a brief death struggle. When death does not occur for several hours it is apparently also generally due to hæmorrhage, seldom to metritis or peritonitis, as the animal is generally not very restless and usually dies without a protracted struggle. Fatal hæmorrhage at times occurs from very small injuries. At least in some cases of fatal hæmorrhage I have not been able to discover the injury during the life of the animal. In such instances there appears to occur a diffuse hæmorrhage from the uterine mucosa or a bleeding into the peritoneal cavity, as I have observed in cases of prolapse of the uterus.

That a mare may prove very resistant, and may live several days with a perforation of the uterus, Case 2, under Version of the Uterus, very well shows.

Prolapse of the Uterus.

Prolapse of the uterus in the mare is likely to occur in a few minutes after delivery, with the first after-pains and before the patient has arisen. In other cases it occurs, according to my observations, several hours after parturition, and as a rule before the expulsion of the after-birth. In one case I saw uterine prolapse after premature birth; generally, however, it occurs after birth at the completion of the normal duration. I have not observed a case following severe dystokia. Prolapse of the uterus is constantly a very dangerous accident, which according to my experience usually ends fatally, especially if the veterinary help is not quickly applied. The uneasiness of the mare, stepping back and forth, lying down and getting up, readily injures the uterus, so that protrusion of the intestine may occur as a complication. Or there occurs a rapidly fatal hæmorrhage through a diffuse bleeding externally, or the blood escapes into the prolapsed uterus and peritoneal cavity. Regarding the handling of the accident, veterinarians are not agreed as to whether the after-birth, if still present, should be removed before reposition of the organ or not. According to my observations, the removal of the after-birth immediately after parturition may be very difficult or impossible, and lead to important hæmorrhage. It is therefore allowable to follow the advice of Strebel, that in case the after-birth is extensively attached to the uterus, to proceed with the reposition without its detachment. The reposition of the uterus in the cases noted by me was generally very easy. After the operation the mare was led about for a time in order to prevent lying down, then tied up in a stall so that she could not lie down, or placed in a sling. I have not sutured the vulva.

In eight cases of prolapse of the uterus which were attended by me during recent years, four of the animals were already dead upon my arrival, one or two hours after the accident; one death occurred during removal of the after-birth; one four hours after the removal of the after-birth and reposition; in two cases recovery followed reposition; in the two last instances the after-birth had already come away.

Case 1.—Prolapse of the uterus occurred almost immediately after parturition. Since the animal was very restless it was cast upon its side and secured. Upon my arrival three or four hours after the accident, although no material injury could be recognised, considerable hæmorrhage had already taken place. Upon attempting to remove

the still firmly adherent after-birth, severe hæmorrhage set in and the mare succumbed when it was only partly detached.

Case 2.—A mare was reported unable to foal. As I entered the stable about an hour after parturition the foal was expelled under violent straining, but without material assistance. A few minutes later, the recumbent mare suddenly began to strain and before I could help it the uterus, completely covered by the attached fœtal membrane, was everted. Attempting to detach the fœtal membrane caused a severe hæmorrhage, so that I desisted from completely removing it and returned this along with the uterus. The reposition was easy and quickly accomplished. The mare died four hours later from hæmorrhage.

Case 3.—After normal parturition a mare suffered almost immediately from prolapse of the uterus. Arriving some three hours later the patient was found in a box stall with the walls and floor covered over with blood. The after-birth had come away, the uterus hung as a bloody mass from the vulva, from one point there came a blood stream the size of a pencil. The uterus was cleansed as well as possible—it was night and scarcely any water at hand—and was then replaced without difficulty. The mare recovered. The owner returned her to light work after three days.

Case 4.—A mare had aborted after a pregnancy of seven to eight months. The after-birth was soon expelled, followed by prolapse of the uterus. The reposition involved some difficulty as the patient strained violently. The mare recovered, but showed a vaginal discharge for some time.

Case 5.—I may here relate a case in which a threatened prolapse of the uterus was with difficulty prevented. This was the mare which I have already described as Case 1, under Contractions. A few minutes after parturition the patient, which had not yet arisen, suddenly began to strain. I was alone with the animal in the stall, while the owner and his servants were removing the dead foal. By striking with the hand and a loud command, I failed to induce the patient to get up. In order to prevent an impending prolapse I quickly inserted both arms in the vagina, for which purpose I did not have time to roll up my shirt-sleeves. In the meantime the owner returned and after energetic efforts succeeded in making the mare get up. The animal was now moved about and in order to prevent her lying down it was necessary to use the whip. When she had become quieted she was returned to the stall and tied up high and two bags passed under her abdomen and chest and four straps placed under the body so that it was impossible for her to lie down. The placenta came away a few hours later and the straining ceased.

Prolapse of the Bladder.

In cases of dystokia the neck of the bladder is frequently found so dilated that three or four fingers, or the entire hand, can be passed through it. Nevertheless, the prolapse of the bladder occurs seldom. Its occurrence is largely caused through severe straining. The mare may go several days with prolapse of the bladder without material disturbance of her general well-being.

Case 1.—A seven-year-old mare had foaled eight days before at night without aid. The after-birth came away promptly. After par-

turition the mare had constantly passed urine in very small quantities, either in drops or only a teaspoonful at a time. In the last two days the appetite was somewhat diminished. Examination showed the mare to be in general good health, the appetite good and the pulse 44 per minute. In moving the animal, urine dribbled away either in drops or small quantities. Exploration *per vaginam* revealed the existence of prolapse of the bladder. The everted bladder was of the size of a small fist, pear-shaped, wrinkled, firm, the neck of the bladder narrow, firm, and immovable, so that a reposition could not take place without special preparation. The neck of the bladder must first be gradually dilated with the fingers. During these manipulations the mare strained violently so that the bladder was at times visible between the lips of the vulva. After nearly an hour of hard work reposition was accomplished. The hand could now be inserted clear through the neck of the bladder. In order to prevent straining as far as possible and a recurrence of the prolapse, the mare was brought out quickly after reposition and at first trotted for a time and then walked. During exercise the urine was voided nearly the same as before the operation at very brief intervals in small amounts. One could see, however, by holding the lips of the vulva apart, that the bladder had not prolapsed again. It was reported that after the mare was replaced in the stall she again strained violently and was therefore turned out upon a meadow with the foal. Here she busily ate grass and ceased straining, but it was several days before the urine was normally retained, and voided in large quantities.

Case 2.—A mare had foaled with difficulty. The urine was thereafter voided in small quantities in the form of a spray. I was called to the animal fourteen days later, her appetite having become decreased. By exploration I found the bladder prolapsed. It was of the size of a double fist, was reddened, firm, the neck of the bladder firmly contracted. When the mare strained the bladder appeared between the lips of the vulva. Reposition was accomplished with difficulty after a tedious dilatation of the neck of the bladder as in the preceding case. Nothing further was done. The mare recovered.

Retention of the After-birth.

It is comparatively common in the mare for the after-birth to fail to come away at the proper time and be delayed twelve to twenty-four hours. Rarely it remains even longer. The animal is usually somewhat restless, it strains now and then, the appetite tends to remain normal, or only very slightly decreased. Even in prolonged retention of the after-birth I have not seen severe illness or a case of death. However, there sometimes occur chills, elevated temperature, decrease or complete loss of appetite. These symptoms are of brief duration, they disappear even before the expulsion of the membranes. These symptoms, however, may appear to a small degree in mares which have foaled normally and the after-birth has apparently been expelled. In such cases I have found fragments of decomposed after-birth lying free within the uterus.

In reference to the method of handling, the views of veterinarians vary. While some advise the removal, others favour waiting six or eight hours, while still others postpone it for a longer time. I favour

the removal not earlier than twenty-four hours after parturition, and even then there are exceptions when the membranes cannot be easily and completely removed at this time. In some cases even after twenty-four hours, adhesion between the maternal and fœtal placentæ is still so firm that a complete separation cannot be had or a severe hæmorrhage follows. When veterinarians remove the after-birth after a few hours and assert that the operation is easy, it would seem that they had generally met with cases in which the membranes would have come away spontaneously in eighteen to twenty-four hours.

Case 1.—An aged mare, which after the normal duration of pregnancy had given birth to a living foal, but which had not expelled the fœtal membranes, became ill eighteen hours after parturition. When examined twenty-two hours after parturition the mare had a marked chill, pulse 100, regular and bounding. The appetite was scant. The fœtal membranes protruded from the vulva, and hung down to the hocks. The after-birth was adherent throughout its entire extent, was emphysematous and friable. The detachment was only partly successful. In the body of the uterus the adhesion was so firm that the operation could not be completed. Eleven hours later there was little change; the pulse was 96 per minute. The chill had disappeared and the appetite was better. The uterus was irrigated with a ½ per cent. tepid lysol solution during which the patient was perfectly quiet. Forty-eight hours after parturition the pulse was still 60 per minute; the appetite was much improved. It was not until sixty-eight hours after parturition that the after-birth came away. No further complications occurred.

Case 2.—After several hours of mild labour a young mare had brought forth a fully matured but dead foal early on March 26. On the morning of the 27th the after-birth had not come away and was still firmly adherent to the uterus. After partially detaching the posterior portion I was obliged to desist because the further forward I went the more firmly was it attached and slight hæmorrhage occurred. It was reported that the mare ate but little on the 28th, but on the 29th the appetite was good. The after-birth came away on the evening of the 30th, that is, four and a-half days after parturition. The mare recovered.

Case 3.—An aged mare had given birth to a living foal forty-eight hours previously. The after-birth had not been expelled and after twenty-four hours the patient had become stiff and there was a loss of appetite. Upon examination laminitis was recognised. The placenta was attached only at the apex and was very friable. It did not permit of detachment, a small fragment remained. The uterus was washed out with a weak lysol solution. The symptoms of laminitis disappeared in a few days without treatment.

[*Translator's comments.*—The somewhat extensive article of Tapken has been inserted in full, because it is in many respects a contribution of great excellence, and it brings out prominently the marked differences between obstetrics in the mare and cow. The experience of Tapken has varied in numerous respects from that of the translator. In his table numerous data of great interest have been brought out, and we regret to say that we cannot place along the side of this definite statistics of our own. In a general way it seems to us that the mortality among mares in the experience of Tapken has exceeded

our own, while the deaths among foals have been markedly less. In fact, in an extensive obstetric experience the writer did not deliver a living foal in a case which could properly be termed dystokia. True, occasionally a living foal was delivered, but in such cases it so occurred that it was reasonable to suppose that it would have been born without any assistance.

The table brings out in bold contrast the greater necessity for embryotomy in the mare than in the cow. In our judgment we have resorted to embryotomy in a larger percentage of cases of dystokia in the mare than has Tapken. We have already commented upon the version of the uterus, and a method of attaching a cord to the inferior maxilla. His experience with lateral deviation of the head is interesting, and especially the fact that a large proportion of mares have lived after forcible extraction. We have uniformly resorted to embryotomy in cases of deviation of the head, unless a correction of the anomaly could be readily brought about. Our method of embryotomy in cases of lateral deviation is similar to that of Tapken, except that we find great benefit from evisceration after the subcutaneous removal of the exposed limb, after which the extraction of the remnant of the fœtus is quite easy.

Our method of handling posterior presentations has differed somewhat from that of Tapken. When the tarsus presents and is not readily corrected, we have preferred amputating through the hock with the chisel. We consider this instrument much easier of application, safer for the mare and highly effective, while in some cases, like in his Case 4, the chain saw could not be applied, and presumably the Pflanz embryotome would have been equally impractical, as it needs to be handled in the same manner, consisting as it does of essentially a large ecraseur-like instrument, which must be passed around the leg much the same as a chain saw.

In the breech presentation Tapken apparently experienced much difficulty, and has failed to accomplish delivery in 50 per cent. of his cases. We have uniformly adopted a different course, and have as uniformly succeeded in bringing about delivery in a large number of cases, and generally with good success. We resort at once to the intra-pelvic amputation of both hind legs as described in our "Surgical and Obstetrical Operations." By this means the delivery is prompt, comparatively easy, the danger of injury to the mare is almost *nil*, and the results are highly satisfactory.

The experience of Tapken with the vertical presentation, that is, those cases presented anteriorly with the hind feet extended forward in the pelvis, is essentially parallel with our own. In our experience it stands next to what we have termed "transverse or bi-cornual development of the fœtus," or what Tapken has interpreted as "version of the uterus," in point of seriousness. We definitely recall three cases of this character. One died from hæmorrhage shortly after our arrival, before any measures had been taken for delivery. Another was delivered without difficulty, but succumbed later to gangrene of the genital passage. In the third case the owner had attempted delivery, and had greatly lacerated and abraded the vulva and vagina. Delivery was not very difficult and the mare recovered, but suffered for a long time from vaginitis and purulent cystitis.

On the whole our instruments for embryotomy are far simpler

than those of Tapken, and have proven in our hands highly efficient. They consist of cords, a finger knife, a chisel, and a long blunt hook. The chisel can be applied anywhere that the saw or embryotome can be used, and in many places where they cannot.

In the experience of Tapken prolapse of the uterus and retention of the fœtal membranes have been comparatively far greater than has been seen by us. In our experience the retention of the after-birth has generally been confined to a small piece of the membrane which has remained adherent in the non-gravid cornu of the uterus, where it has uniformly set up an endometritis with concurrent laminitis.]

NEW REGULATIONS OF THE BOARD OF AGRICULTURE AND FISHERIES.

Veterinary Inspectors.

SUBJECTS OF EXAMINATION.

(1) Pathology and Bacteriology.

(2) *The Diseases of Animals Acts, 1894 to 1903, and any Act amending the same: and the Orders of the Board of Agriculture and Fisheries thereunder.

In Subject 1 there will be a Practical as well as a Written Examination. Candidates must pass to the satisfaction of the Civil Service Commissioners in both these subjects.

SYLLABUS OF THE EXAMINATION IN PATHOLOGY AND BACTERIOLOGY.

(*a*) WRITTEN EXAMINATION.

(1) *General Pathology.*—Inflammation; the Degenerations and Infiltrations; Neoplasms.

(2) *Bacteriology.*—Bacteriological Methods; Principles of Immunity and Vaccination; Disinfection; the bacteria pathogenic for the domesticated animals, including the morbid anatomy and histology of the lesions which they produce, and the methods whereby certain diseases are communicated from animals to human beings.

(3) *Protozoology.*—General biology of the pathogenic protozoa. The Coccidioses, Trypanosomiases, Piroplasmoses, of the domesticated animals.

(4) *Epizootiology.*—The etiology, symptomatology, and differential diagnosis, of the contagious diseases of animals.

(*b*) PRACTICAL EXAMINATION.

Candidates will be tested with regard to their practical knowledge of bacteriological methods, and specially with regard to their ability to apply these in the diagnosis of the principal contagious diseases of the domesticated animals.

Limits of Age: 25 and 35: with an extension up to 45 in the case of Assistant Veterinary Inspectors under the Board of Agriculture and Fisheries, who may have served continuously from a time when they

* The Orders referred to are contained in the latest Edition of the "Handbook of the Diseases of Animals Acts, &c.," printed for His Majesty's Stationery Office, and to be purchased from WYMAN & SONS, LTD., Fetter Lane, London, E.C. The latest Edition is at present that of 1906, but it may be from time to time supplemented by later Orders, copies of which can be obtained gratis on application to the Secretary, Board of Agriculture and Fisheries, 4, Whitehall Place, London, S.W.

were under 35; and with the provision that members of the Military and Naval Services (whether commissioned or non-commissioned) may deduct from their actual age any time during which they may have served towards pension.

An Official nomination by the Board of Agriculture and Fisheries is required for this situation.

Civil Service Commission, London, W.,
July, 1906.

On the official nomination by the Board of Agriculture and Fisheries, the Civil Service Commissioners notified the following to sit for the examination to qualify for the post of permanent veterinary inspectors on the Board of Agriculture and Fisheries,—Berry, A. H., F.R.C.V.S., Brand, J., F.R.C.V.S., Edwards, E. R., F.R.C.V.S., Jackson, J. R., M.R.C.V.S., Munro, A. M., M.R.C.V.S., Peacey, E., F.R.C.V.S. Those who pass these examinations are eligible for the permanent staff when vacancies arise, and all the above gentlemen passed satisfactorily. The next examination will be held in May. Professor Sir John M'Fadyean was the Examiner appointed for the professional part of the examination, both written and practical.

Translations and Extracts.

THROMBO-EMBOLIC COLIC AND INTESTINAL CONGESTION.

BY M. L. MAGNIN, VETERINAIRE EN 1ER ARTILLERY.

THAT condition of the intestines which is caused by thrombosis or embolism of the intestinal arteries and accompanied by colic, was first designated thrombo-embolic colic in Germany. Under a misapprehension French pathologists took the term to apply to any intestinal congestion from any cause whatsoever. Certain forms of intestinal congestion are undoubtedly thrombo-embolic congestion, but there are other pathological changes due to thrombosis and embolism.

Aneurism.—The principal, if not the only, cause of thrombo-embolic colic in the horse, and which in this animal is very common, is parasitic aneurism in the large mesenteric, caused by *Sclerostomum equinum* (Muller). Out of 100 horses, Bollinger found that 90 to 94 had one or more parasitic aneurisms. Ellenberger found 84 in 85 dissecting room subjects, but that foals under six months old were practically exempt. On the other hand, Matthiesen, Franke, Schütze and Poepple, state that they have found aneurisms in foals three months old, and Poepple records a case of one of ten days in which there was an aneurism the size of a pigeon's egg. This points to the possibility of uterine infection, and the microscopical appearance of the embryos seems to favour it (Hutyra and Marek).

Regarding parasitic aneurisms, Bollinger found 168 in 100 animals examined, viz., 153 in the large mesenteric and its branches, 4 in the cœliac trunk, 3 in the hepatic artery, 3 in the small mesenteric, 3 in the renal arteries, and 2 in the posterior aorta.

According to Hutyra and Marek ("Spezielle Pathologie and Therapie der Hanstiare," vol. ii., p. 327), parasitic aneurisms of the large mesenteric are generally found in the trunk of the right branch, and very

rarely simultaneously or exclusively in the branches. They differ very much in size, running up to that of a man's head, and 30 centimetres or more long (Friedberger and Fröhner). In some cases the aneurisms are stuffed full of sclerostoma, in others there are but few. They are sometimes prolonged into the aorta and into the emergent arteries, forming long conical columns that sway about, like river mud, in the blood current. The walls of the aneurism frequently become calcified in patches, and are always greatly thickened. This fact explains the rarity of rupture of this class of aneurism, and when it does take place it will usually be found that there is a weak spot in the wall. When this condition is present it will be found that the subjects are old, and that there are several dilatations, more or less coalescing, as if they had formed at different periods.

In many cases the sacs are empty, contrary to what is stated by the majority of authors, viz., that they always contain an adherent thrombus, also portions of ancient thrombi free in the cavity, which has an important bearing on this article and the view taken by the author. This is explained by Virchow that the reabsorption of the clot commences at its outer circumference, where it is in contact with the arterial walls. The clot is disintegrated by the blood penetrating between it and the wall of the vessel, and the granulations being broken down, the circulation is re-established, the process of absorption is complete or partial (Labat, article "Thrombose," "Nouveau Dictionnaire Pratique," de Boulay et Reynal, vol. xxii., p. 159).

Usually, however, the clot undergoes softening, commencing from the centre. The substance is transformed into a semi-fluid pulp of a grey or red colour, something like pus. At the commencement of the process this fluid material is surrounded by the walls of the clot, but gradually these undergo the same process and break up into various sized fragments that form embolic. The disintegration of the thrombus is facilitated by the migration of the sclerostoma, which many authorities say takes place in May and August, and certainly colic and intestinal congestion are most prevalent during these months of the year.

This softening, however, is not always simple, and if organisms gain access to the thrombus it may become putrid or septic. This is likely to take place in animals that are in bad health, low condition, living in an insanitary condition, and a variety of other causes. This is a point to be considered in the frequency of colic in emaciated animals in bad condition and over-worked.

The clot may become organised by the formation of fibro-vascular granulations in the inflamed membrane, by which it adheres to the walls, and which penetrate into it, forming it into a newly formed connective tissue. In some cases organisation of the external and softening of the centre of the clot is found going on at one and the same time.

In whatever form softening takes place, it ends in disintegration, and the clot breaking up into fragments, that are carried away in the current of the blood, till they are arrested in one of the arterial networks that is too small to allow of their passage, fresh layers of fibrin are formed, and secondary thrombi also.

As in all other parts, the results of intestinal emboli depend on their number and size ("The obliteration of an artery by emboli is followed by a variety of lesions," Cornil et Ranvier "Traité d'histologie Pathologique," 2nd edition, vol. i., p. 606). Here, as in the limbs, serious effects

are not produced until collateral circulation is altogether arrested or greatly interfered with, which is quite different to those organs in which the arteries are few in number, such as the kidney, spleen and brain, where a single clot will cause great disturbance of the functions. "In the limbs a single embolism will no more cause gangrene than the ligaturing of an artery will" (Cornil et Ranvier, *loc. cit.*, p. 606). Colin remarks on this point: "If the principal artery of a limb, the humeral or femoral, is obstructed by an adhering clot, the circulation, although weakened, still exists in the lower part. Although the arteries of the limbs can no more be regarded as being terminal than those in the intestine, no one doubts that certain conditions in them are due to embolism." All the same, the term is a misnomer, as there can no more be terminal arteries in Bollinger's acceptation of the term, than there can be terminal circulation.

Frequency.—That there is such a thing as thrombo-embolic colic cannot be for a moment doubted; this has been clearly demonstrated by Cornevin, Bollinger, Hue and Cocu, and others. Bollinger says that in a square centimetre of mesentery he has found as many as from five to six obliterated veins and arteries. M. Railliet (*Bulletin de la Société Centrale de Médecine Vétérinaire*, 1896, p. 394) gives M. Hue and Cocu's directions for finding these intestinal thrombi, which is not difficult in a chronic case.

The large mesenteric artery should always be examined in colic cases, as it may give a valuable clue to the cause. The aorta should be ligatured each side of the aneurism, which should be carefully dissected so that none of the contents are lost.

The sclerostoma migrate in May and August, and at this season of the year colic and intestinal congestion are most prevalent. All writers agree that intestinal congestion, which is common enough in the horse, is extremely rare in the ox, and almost unknown in the other domestic animals: a coincidence is that they are not troubled with parasitic aneurism. The same applies to young foals under the age of six months.

A point to be noticed is that the ordinary lesions of intestinal congestion are hardly ever seen in the floating colon and anterior portion of the small intestine that derive their blood supply from arteries, the trunks of which are not affected with parasitic aneurism.

Another important fact is that the lesions of thrombo-embolic colic are always confined to a single organ or a single portion of the intestine which derives its blood supply from the artery in which is the aneurism, or from those arteries into which the thrombus is extended. It has been said that the limited lesions in the large intestine, "where they are most common," are of microbian origin, but this requires further proof. This opinion is not universally held. Out of sixty-nine *post mortems*, Reynal found the lesion in the posterior portion of the small intestine in 41, in large colon and cæcum 24, and mesentery in 4 cases (Article, "Colic," "Nouveau Dictionnaire Pratique," vol. iv., p. 276). Reynal's observations are confirmed by Saint-Cyr ("Cours. Lithographie," 1881-82), and by Cluyet (*Bulletin de la Société Centrale de Médecine Vétérinaire*, 1907, p. 265). The real reason is that the site of the lesion depends on the situation of the aneurism and the prolongation of the thrombi.

The prevalence of thrombo-embolic colic is a question of locality, it being most common in places where parasitic aneurism is rife.

Isolated cases may pass unrecognised, but in certain localities, and during certain seasons, cases are so common as almost to amount to an epizootic (*Bulletin de la Société Centrale de Médecine Vétérinaire*, 1904, pp. 70, 435, and 792).

At the Budapest Veterinary School, the percentage of cases of colic from infarction of the intestinal walls was 27 per cent. in 1900, 37 per cent. 1901, 24 per cent. 1902, 23 per cent. 1903, 30 per cent. 1904; of these, 15 per cent. were diagnosed during life. The diagnosis, except in the case of epizootics, is, however, a matter of conjecture, as there are no specific symptoms.

At the Dresden School the figures are : 11 per cent. 1903, 5 per cent. 1902, 6 per cent. 1901, 15 per cent. 1900, and 6 per cent. 1899.

These statistics show that the prevalence of thrombo-embolic colic depends a good deal on locality, but military statistics are not very reliable, as *post-mortem* examinations are not always very carefully made. In those of the Prussian Army there is a much larger percentage of twists of the colon, &c., than in the French, but careful examination shows that these are almost always secondary and dependent on primary thrombo-embolism.

The Intestinal Circulation.—The anterior mesenteric artery supplies the whole of the intestine, except the anterior part of the duodenum, which is served by the cœliac axis, and the middle and terminal part of the small colon, which is served by the posterior mesenteric. The anterior mesenteric forms a large trunk a few centimetres in length, which anteriorly and slightly to the left gives off the left colic (dorsal colic artery of the Germans) that turns backward and supplies the third and fourth portions of the large colon. It also gives off the first artery of the floating colon (middle colic), which goes to the anterior portion of the small colon. As a rule, both these arteries spring from a common trunk. Posteriorly and slightly to the left, the seventeen to twenty arteries of the small intestine (jejunal arteries) that supply the small intestine. The mesenteric trunk then becomes smaller, and in Germany is called the cæco-colic artery. It is about 2 to 4 cm. in length, and gives off the right or direct colic artery (ventral colic), which goes to the first and second portions of the large colon. The remaining portion (ileo-cæcal) divides up into the superior or internal cæcal (median cæcal, German), external or inferior cæcal (lateral cæcal, German), and the ileo-cæcal (iliac branch, German). The first two spread over the wall of the cæcum, the last over the illeo-cæcal portion of the small intestine and part of the cæcum. The inferior cæcal artery gives off a branch, the artery of the arch of the cæcum (lateral colic artery of Franck).

In the region of the duodenum the first of the small intestinal arteries anastomose by means of a fairly large branch with the duodenal, that is divided from the cœliac trunk. These arteries communicate with each other, and their last branch with the ileo-cæcal, by an anastomosis in the form of an arch. The right colic and ileo-cæcal are joined with the vessels of the cæcum, and these latter with each other by a rich anastomosis. The left colic artery turns back and unites with the right one in the pelvic loop forming the largest anastomosis in the body. The right colic artery also anastomoses with the artery of the cæcal arch.

There are also anastomoses between the left colic artery and the first one of the floating colon, between it and the first branch of the posterior mesenteric, also between all the branches of this latter, and it will be easy to understand how collateral circulation can be established between the anterior mesenteric by either the cœliac or posterior mesenteric arteries. It is also important to realise that branches that are detached from the vascular arches, and that those in the intestinal walls and mysentery, as well as those given off from the trunk, form rich anastomoses.

Pathology.—The mesenteric aneurism has a double influence in causing thrombo-embolic colic, first by the obstruction caused to the circulation by the thrombus, and secondly by the emboli that become detached from the mass.

A thrombus that either totally or partially blocks up the vessel does not stop the blood flow by this reason alone, but the changes that take place in the organs and the pressure on it will interfere with the collateral circulation, which frequently is insufficient.

It is generally admitted that such obstructions cause paralysis of the bowel of a varying degree of intensity, and such stagnation of the contents gives rise to chronic intestinal indigestion.

The experiments made by Marek tend to show that the accepted theory requires modification in certain important points, and in the work published in conjunction with Hutyra, "Traite de Pathologie et de Therapeutique Speciales," he gives his views on the subject.

According to the accepted opinion, the larvæ, on arrival at the mesenteric artery, adhere to the lining membrane, which they perforate, setting up inflammation and the formation of a blood clot. After the lapse of a certain time the walls of the artery thicken, blood-vessels form in them, and the whole vessel dilates. Sticker thinks that the larvæ penetrate into the walls of the artery, giving rise at first to meso- and afterwards to peri- and endo-arteritis.

The resulting thrombus causes total or partial obliteration of the vessels. Complete obstruction of the anterior mesenteric is uncommon, that of the ileo-cæco colic is more frequent, but frequently the thrombus from these vessels is prolonged into the emergent arteries, completely blocking them. In other cases a new aneurism forms containing a clot that completely obliterates it.

The obliteration of the different branches of the anterior mesenteric artery may be caused by the end of the thrombus being pressed against the orifice by the force of the blood current, and in this way it is quite possible that a thrombus in the right trunk will obliterate the left colic or left small intestinal artery. In the majority of cases, however, the smallest peripheric arteries are obliterated by an embolus that is detached and carried away in the current of the blood, and the larger the size of the detached embolus the more important will be the artery that gets plugged. It, however, by no means follows that a thrombus is necessarily followed by the formation of an embolus.

The result of obliteration of an artery depends on the size of the vessel, the situation in which the plug is situated, and the importance of the anastomosing vessels. If the arteries of the intestinal walls are obliterated as those situated below the anastomosing arches of the small intestine or small colon, there will be no interference with the circulation on account of the collateral branches.

If one of the larger arteries, such as a colic or cæcal, is obliterated then the blood supply to the neighbouring regions will be insufficient. The blood pressure in the obliterated arteries is decreased in proportion with their size and may even fall to zero, and may be so low as not to be able to overcome that in the veins. The consequences are that there is arterial anæmia and venous congestion of the intestinal walls, with rapid accummulation of carbonic acid in the blood.

If the complicated area is not too large the circulation is re-established by the anastomosing branches, but not before local hæmorrhage, to a greater or lesser extent, has taken place.

If the area is larger circulation may not be retarded for some hours, when clots will form in the intestine, its walls, and even in the abdominal cavity. Should any of the larger arterial trunks, such as the anterior or posterior mesenteric, their two large branches in the neighbourhood or above the anatomosing arches, the two colic or cæcal arteries, become obliterated, the pressure becomes so low that the venous congestion is never overcome.

The blood stagnates as readily in the arteries as in the capillaries and veins, and by contact with the tissues becomes more and more charged with carbonic acid. During the first half hour serum only is exuded. but this is followed by red blood corpuscles into both the abdominal cavity and the interior of the intestine. The formation of sero-hæmorrhagic infarcts in the intestinal wall and its infiltration give rise to symptoms of colic, and the supply of arterial blood is eventually altogether cut off. When this takes place the intestinal epithelium will mortify in about two hours, but the other coats will resist this process for a longer time. In cases where not only the main trunk but the anastomosing branches are obliterated and the blood supply completely cut off the other coats of the intestine also mortify. In such cases, on the borders of the anæmic area there is a certain amount of stain from the blood that gains access by the small capillaries that still remain patent, but such are extremely rare.

Marek's experiments go to disprove those of Virchow, Cohnheim, Panum, and Litten, who maintained that when the pressure in the mesenteric artery fell to zero there was regurgitation from the veins to the arteries through the capillaries. He found that when the mesenteric artery, an anastomosing branch, or even an artery below the anastomosing arch, was ligatured in the dog, and the animal then killed at a period varying between three-quarters and forty-eight hours afterwards, there was nothing abnormal in the corresponding portion of the intestine.

Ligature of two neighbouring arteries of the small intestine or of the root trunk of the three anastomosing arches causes the mucous membrane to become red and covered over with various sized hæmorrhagic patches in from three-quarters to one and a half hours. If the dog is slaughtered at about the seventh hour the red colour of the mucous membrane has disappeared, and only the hæmorrhagic patches remain, and even these are not very numerous. In some cases the contents of the bowel are stained with blood, but there is no mortifications of the epithelium. Ligature of the neighbouring arteries that form more than three arches, such as the anterior mesenteric trunk, gives rise to hæmorrhagic infarction and death. If the cœliac and posterior mesenteric arteries are both ligatured as well as the mesenteric,

the region supplied is rendered permanently anæmic, and isolated hæmorrhagic patches of a clear greyish-red colour are found in the sub-mucous tissue. Hæmorrhagic infarction takes place in the walls of the stomach supplied by the œsophageal and in the rectum which is supplied by the hypogastric artery. Similar conditions are noticed if two or more arteries of the small intestine, with the anastomosing branches in connection with them, are tied. When the anterior mesenteric artery and the anastomosing branches that supply a considerable portion of the small intestine are ligatured this portion becomes anæmic, whereas in that supplied by the ligatured anterior mesenteric a large infarction forms.

In the experiments described there was no tumefaction of the veins corresponding with the obliterated arteries, on the contrary, when the anterior mesenteric artery and vein were both ligatured there was considerable congestion of the mesenteric vein.

If the cœliac and both anterior and posterior mesenteric arteries are ligatured at the same time, the result will be that there will be no hæmorrhagic infarction in the portion of the intestine supplied by the latter. In the same way it will not form unless the mesenteric vein and artery are ligatured at the same time.

It is easy to demonstrate how after simultaneous ligature of the cœliac, anterior and mesenteric arteries that blood arrives at the parts supplied by the two former, by injecting a solution of sulphate of soda coloured blue into the veins, when that part supplied by the cœliac and mesenteric arteries which was previously anæmic will be stained blue.

In the horse, compression of the ileo-cæco colic artery will cause death from colic in twelve hours. The cæcum is soft, easily torn, and hæmorrhagic infarctions are found both in it and the terminal portions of the small intestine. Ligature of only one of the two colic arteries causes colic, lasting from one and a half to four hours, followed by recovery; but if both are tied close to their origin, fatal colic is caused with necrosis of the colon, with infarctions of the adjacent mesentry. Ligature of the right colic artery at its origin, a few weeks after that of its anastomosing branch with the left colic in the pelvic loop, caused an attack of colic which lasted about twelve hours, but which ultimately recovered.

These experiments are of considerable value in demonstrating that certain pathological conditions that obliterate the mesenteric arteries cause certain results. If the closure of the mesenteric arteries take place gradually, the anastomosing branches gradually enlarge in calibre, in proportion to the growth of the thrombus, and it is on account of this reason that when it is formed gradually violent and dangerous symptoms do not occur. All the same, when the large trunks become stopped, derangement of the circulation is set up, which is irreparable; furthermore, the larger the obstructed vessel is, the quicker its partial obliteration will give rise to such derangement. The intestinal functions are not disturbed by the obliteration of an artery, unless the circulation in the other collateral vessels supplying the part is deranged at the same time; then the resulting anæmia is increased, and the carbonic acid that accumulates in the stagnant blood acts as a stimulant on the muscular coat of the intestine, causing it to contract in violent and frequent spasms, which give rise to pain and colic. In some rare

cases where the intestine is not furnished with anastomosing or collateral vessels, the spasms that are caused by the accumulation of carbonic acid in the blood, although violent at first, cease after a few hours. *Per contra*, if there is collateral circulation, even if incomplete, the spasmodic contractions continue, as the oxygenised blood on arrival at the part still contains a considerable quantity of carbonic acid.

In slight cases where the circulation of the blood is re-established the movements of the intestine become normal, without any further result than slight hæmorrhage taking place, or mere transient inflammation. In those cases where a considerable portion of the bowel is deprived of blood, or a large number of small vessels are obliterated so that the blood supply is insufficient, the circulation is not re-established, and in one or two hours there is sero-sanguineous exudation into the walls of the intestine, the bowel itself, and the abdominal cavity. This infiltration causes mechanical muscular contraction, which to a certain extent quickens the passage of the contents, and on the other hand it gives rise to paralysis, on account of the supply of oxygenised blood by the anastomosing vessels being cut short.

The contents of this portion of the intestine very shortly contain a considerable admixture of blood, and early ferment and give off gas, which is not reabsorbed by the insufficient amount of blood, or if it is, only slowly. It fills up the intestine, and as a result the contractions that are already enfeebled by the formation of infarctions are still more interfered with.

Panum and many other observers have shown that the bowels of the turbinara, especially the horse, contain large quantities of gas. The intestinal paralysis is to a very considerable extent due to this flatulence, which arises very quickly, and this fact is almost of more importance than the insufficiency of the collateral circulation, in the time in which paralysis will arise.

In most cases paralysis of the intestine takes place before the intestinal contents from the affected portion arrive at the rectum, as the paralysed portion tends to obstruct them. As a result, after cessation of peristalsis in the primarily affected part the contents remain stationary, although by the spasms a certain small portion is forced back into the stomach.

The influence exerted on the movements of the intestines by obliteration of the mesenteric arteries is explained in various ways by different authors. Panum, Cohn and Bollinger consider that intestinal paralysis sets in at once in the part supplied by the obliterated artery, but their view is opposed to what has been observed in the human subject, as it is common to find blood-stained stools pass during the entire duration of the illness, which would be an impossibility if paralysis set in at the moment the artery became obstructed. Litten, Marek and others have observed the same in the dog, and in reality experiments made on animals clearly prove that the immediate result of obstruction of the circulation is not paralysis, but, on the contrary, increased peristalsis, at times becoming spasmodic, accompanied with pains and colic. Hader states that with dogs and cats the intestinal movements continued for four or five hours after ligature of the mesenteric arteries. Marek found that in the dog within a few seconds, very rarely as long as two minutes after ligature of the artery, in the

entire portion of the bowel dependent on it for its blood supply, most violent contractions took place, and frequently in more than one portion at the same time. These contractions lasted as long as the animal was kept alive, and after death for an average of about one and a quarter hours, if the body was maintained at 37° C. If the intestine is hung so that certain loops become filled with the contents, movement ceases in those parts. When the anterior mesenteric artery was ligatured, and at the same time some of the anastomosing branches causing anæmia in the part supplied by them, and infarction in that depending on the mesenteric, the peristaltic movements ceased in about an hour and a half in the anæmic portion, but continued in the other.

These experiments all go to prove positively that obstruction of the mesenteric artery does not immediately cause paralysis of the intestine, it only occurs in those cases that are complicated with anæmia, and in about a hour and a half after this obliteration takes place; indeed at first it is increased. In other cases, that is to say, in those in which the intestine receives a greater or lesser supply of arterial blood from the anastomoses that remain patent there may or may not be paralysis. In those cases in which there is serious disturbance, these portions become paralysed by the accumulation of gas, "particularly in the horse," before infiltration sets in, and before nutrition changes cause paralysis to a sufficient degree to become injurious flatulence is very slight, or more usually is altogether absent. Paralysis, therefore, cannot be looked upon as the cause of intestinal trouble originating from thrombus or embolism as it does not take place till the end, and even when it does set in it is always preceded by a period of increased peristaltic action. It is not for a moment denied that intestinal paralysis does not exist under certain conditions, as, for instance, colic from coprostasis of the colon. Such chronic intestinal indigestion is more generally due to progressive accumulation of food than by eating a large quantity in a hearty meal.

The intestinal wall being in a defective nutritive condition allows the passage of the intestinal bacteria at an early stage, which rapidly multiply in the abdominal cavity and induce peritonitis, which is the cause of the continual pain. They also gain access to the blood, and from the toxins they elaborate produce intoxication with the usual general symptoms. The presence of the large quantity of gas that dilates the intestine can also be ascribed to the same cause.

All these conditions explain why thrombosis of the mesenteric artery, although it so frequently gives rise to lesions in the vessels that are derived from it, only very rarely causes clinical symptoms that can be in any way looked upon as diagnostic. Bollinger's opinion must be accepted with reservation, for he states that three-fourths of the cases of colic are due to aneurism of the large mesenteric.

In the Budapest School 15 per cent. of the cases of colic were diagnosed during life as being caused by thrombus or embolism, and the fatal cases are looked on as being caused by thromboses, those that recover by emboli.

MM. Banet and Coquot, of Alfort, ligatured the right colic artery in a horse close to the anastomosing arch, but as there was no intestinal congestion they came to the conclusion that the condition were not of a thrombo-embolic nature (*Recueil de Médecine Vétérinaire*, 1905, p. 409). This experiment has already been criticised (*Recueil de Médecine Vétér-*

inaire, 1905, p. 559), and it would appear that these authors have been mistaken, as having ligatured the branch close to the main trunk the intestinal circulation was not arrested, and under such conditions, of course, nothing abnormal was seen. If instead of putting on two ligatures a centimetre apart the second one had been placed on the root of one or other of the colic arteries giving rise to an embolism with a thrombus the result would have been different. Banet and Coquot's experiment simply proves that the anastomosing branch can be ligatured without any danger.

Against the embolic theory certain other authors (M. Petit, *Bulletin de la Société Centrale de Médecine Vétérinaire*, 1904, p. 441) have brought forward anatomical facts, particularly as to the system of anastomoses of the mesenteric vessels, which in case of complete obstruction of both intestinal arteries can carry on the circulation. Marek's experiments completely contradict this. M. Barriere makes a point of the condition of the aneurisms that are present in aged dissecting room subjects, they being adherent and their walls strong. It is only necessary to mention that these animals did not die from colic.

Against the embolic theory MM. Banet, Coquot and Petit (*Recueil de Médecine Vétérinaire* 1905, p. 413; *Bulletin de la Société Centrale*, 1905, p. 352) quote certain cases of old-standing intestinal thrombosis in old animals that were in perfect health, but the history of these horses is unknown, and it is impossible to say that they have never suffered from colic. The intestinal congestion is not necessarily fatal, and Neumann has found traces of former attacks in old animals that were used as dissecting room subjects. Marek's experiments clearly prove that complete obliteration of one colic artery gives rise to an attack of colic, usually not fatal.

It is also a mistake to think that intestinal thrombosis must necessarily cause chronic lesions of the intestinal walls, despite the fact that obliteration of the arteries produces intestinal hæmorrhage.

MM. Barriere and Drouin (*Bulletin de la Société Centrale*, 1905, p. 353), in calling attention to the prevalence of parasitic thrombosis which is so frequent in certain localities, rather question if it is true embolism.

The prophylactic measures to be taken are based on what is known of the life-history of the sclerostoma. The greatest care should be taken with the drinking water. At the Trakennen and Beberbeck studs in Russia, where the disease had been prevalent for many years, and the mortality amongst the foals was very high, it at once stopped when the water was filtered (Mieckley, *Revue Générale de Médecine Vétérinaire*, December 1, 1905, p. 697). The droppings of all suspected animals likely to contain the larvæ of the parasites should be carefully burned, and the walls and floors of the stable periodically disinfected.

Forage grown in damp, marshy places should be carefully avoided, also all green food. In Central France lucerne and clover are accused of giving rise to the disease (Magne, "Traité d'Agriculture Pratique," 4th edition, vol. iii., p. 64, and Reynel, "Nouveau Dictionnaire Pratique," article "Colic," vol. iv., p. 266), so much so that lucerne is prohibited in the French Army from May to August, and sainfoin from April to August. Sudden changes in feeding and watering, defective hygiene, overwork, &c., are all causes of thrombus and embolism, by the strain they put upon the circulation and by the tendency they have to cause the thrombus to disintegrate.

(*Revue Générale de Médecine Vétérinaire.*)

SURRA IN THE FRENCH AFRICAN COLONIES.*

BY M. L. CAZALBOU.

SEVERAL centres of infection have been recently brought to light in Northern Africa, in the immense region constituted by the Sahara and the countries to the north and south.

Recent research has recognised that mbori and surra are identical, and it would appear that the disease extends from the Red Sea on the east to the Atlantic on the west. The author gives a general review of the question.

(1) *Western Africa.* (*a*) *Neighbourhood o, Timbuctoo.*—The disease in dromedaries known to the Maures and Arabs as mbori was studied in 1903. (Note, the real name of the disease is Tabourit, and when a camel is affected with it, it is called "mbori.") The disease was studied in a batch of seventeen animals, of which nine were from 2 to 3 years of age, one of 4 years, five of 6 years, one of 8 years, and one of 10 years, all of which had been in the neighbourhood of Timbuctoo in December, 1902. Their condition was bad, the hump nearly disappeared, and the abdomen greatly tucked up, the skin to a certain degree discoloured, and the hair had fallen off in patches over the body. They, however, ruminated and fed well.

The trypanosome was present in all of them except one, which was probably immune. The numbers of the parasite increased with the degree of fever, being greatest when the temperature rose to 40·5° C., but in the later stages of the disease they were scarce, and the results of microscopic examination were often negative.

The urine was clear, limpid, and without albumin. In some cases there was intermittent diarrhœa. The eyelids were smaller and œdematous, and the eye closed up, with a flow of tears and a collection of greyish gelatinous material in the internal angle of the eye. There was no swelling of the limbs or paralysis, although the animal staggered about somewhat from weakness. On July 1, 1903, eight of the camels had died, and on January 1, 1904, if the immune animal is not reckoned, there were eight that had been ill for less than a year, and in April, 1905, only four were alive. This condition of things did not permit it to be ascertained whether they had become immune or not.

The author in his different journeys in this region always lost a number of camels at the season of the arrival of the caravans conveying salt from the Sahara, and amongst a large number of those which he examined he found that but few, comparatively speaking, were absolutely healthy. The majority were thin and emaciated, with a flow of tears, and there was a strong suspicion of the existence of mbori amongst them. Amongst the various herds of camels that came under his notice he found that adults were few in number, the majority being from 2 to 5 years of age, and that there was a very much larger number of females than males. These facts, he considers, point to permanent infection, and show that the camel breeding industry is not in a very flourishing condition.

At Ras-el-Ma, on the eastern bank of Lake Faguibine, this disease is endemic, also in a wide circle round Timbuctoo, and is carried into

* Translated from the *Revue Générale de Médecine Vétérinaire.*

the Soudan by means of the salt caravans. These caravans are an important factor in the spread of the disease, the region round Timbuctoo and the Soudan to the south being supplied from the mines of Taoudeni, on the great caravan route between Timbuctoo and Morocco. The salt is brought to the latter town, which is the market, and the camels are not kept there longer than necessary, being sent out to graze to the north, along the valley of the Niger, where during a portion of the year the drinking water is obtained from marshes and swamps, but when the dry season comes on from the river itself. These camels are owned by the merchants of Timbuctoo or the tribes of the Equatorial Soudan. The natives are well acquainted with the gadfly (dehab) and the ravages it causes amongst camels; and in the damp parts of the Soudan and in such places Stomoxys are also found. Several owners informed the author that flies accompanied the caravans on the journey to Taoudeni. These, no doubt, were Stomoxys, as gadflies only live in damp places; but it remains yet to be proved if the former propagate the disease. It would therefore appear that mbori is not only met with round Timbuctoo, but as far as Taoudeni.

A large amount of salt from Timbuctoo is brought to Djenne and Macina by river, and from thence it is exported to the Soudan by negro merchants (dioulas), on asses, oxen, and porters. The country above Timbuctoo is supplied by means of camels, *via* Sokoto, Nyamina, Banamba, and Bamako, that below it *via* Bamba and Gao. Goods reach the upper bend of the Niger in the same way, and at Saraferi the author saw a case of mbori in a horse. When it is remembered that Taoudeni is on the direct trade route between Timbuctoo and Morocco, it is easy to understand how mbori can be transported to the latter country.

(*b*) *Sahel.*—There is another salt-mine at Tichct, from which the Senegal and Niger are supplied *via* Nioro and Médine, also the regions on the right bank of the Senegal River. The same condition of things exists here. If the camels are kept in Sahel during the wet season they become infected, and their owners are always anxious to get away again to the north. The animals belonging to the inhabitants are frequently brought into contact with those from Timbuctoo at the grazing grounds of Goumboo and Sokoto.

Mauritania and Senegal. — Since the French occupation a trypanosomiasis has been recognised that has all the characteristics of mbori. The camels that are annually brought to the Senegal at harvest time to transport grain to the Saint Louis—Dakar Railway die in large numbers, and it is not reasonable to suppose that they were ill before arrival. Also when the 1st squadron of the Senegal Spahis arrived in Mauritania from Saint Louis, the horses died in large numbers from what was undoubtedly mbori. In August, 1904, the author saw several animals at Saint Louis that had been in Mauritania suffering from trypanosomiasis that strongly resembled mbori; and at his last visit to Podor, in April, 1906, the officer commanding the post informed him that the mortality was very great. There is no doubt that the disease exists in the Western Sahara, on the trade routes between Timbouctoo and Morocco, Algiers and Tunis.

(2) *Central Africa.*—From the various accounts of travellers no doubt trypanosomiasis exists in Central Africa. Salt is exported from

the oasis of Bilmee to the country round Lake Tchad and the province of Zinder, and periodically there are large caravans of camels passing over the trade route between Tripoli and Tchad. Zinder is in direct communication with Niamey on the Niger, and mbori has been detected at both Niamey and Gao. Zinder is also the starting place for both Air and Tunis.

MM. Foursau and Lamy, in the account of their travels, mention the large number of horses and camels that they had to abandon or which died on the shores of Lake Tchad, viz., on February 11, 1900, six camels and ten horses were abandoned; on the 13th, two camels and eight horses; 14th, twelve horses; 15th, eight horses; 16th, fifteen horses; 20th, seventeen horses (*Bulletin de l'Academie de Médecine*, June 30, 1903, p. 810). And bearing in mind the duration of trypanosomiasis, it is pretty certain that these animals were affected long before they reached Lake Tchad.

The expedition had to be entirely remounted at Air, having lost all the horses and camels that they had started with from Southern Algeria. It is also extremely probable that in the earlier part of the journey the animals were exposed to contagion, and that the oases are no more exempt from surra than the Central Sahara route in Tunis and Tripoli.

(3) *Algeria.*—Chauvrat, Buffard, Schneider, Rennes, Syeweyyk, Sergent, Roger and Greffulhe have demonstrated the existence of various forms of trypanosomiasis in various parts of Algeria, more or less identical with surra. In 1902, M. Deriot showed the author a case of trypanosomiasis that was altogether distinct from dourine, and M. Rennes one that was strongly suspected of being so in a horse of the 2nd Spahis at Medjaed.

M. Sergent considers that the disease called by the Arabs *el debab*, which exists in Morocco, Algeria, Tunis, Tripoli and Egypt, is a form of trypanosomiasis and is much akin to mbori.

Dr. Theiler classes a disease that he has lately seen in camels in Pretoria, that came from the western shore of the Gulf of Aden, as surra, and considers it to be of Asiatic origin. Regarding this theory, it may not be out of place to mention that the last epizootic of cattle plague that devastated almost the whole African continent was brought in from Manamah by Asiatic cattle in 1890. The Gulf of Aden and the Red Sea are simply open doors for the entrance of contagious diseases into Africa. One is therefore driven to the conclusion that surra exists in Northern Africa in various forms of variable virulence, depending on the locality, and there can be no doubt that the different flies act as carriers, and that it is a matter of great commercial importance.

In all the localities mentioned the *Glossina* (tsetse) is not found, but gadflies are abundant, and it is the same in Asia, where surra is prevalent. The tsetse does not extend above 13° north latitude, but the *Glossina* has been found in 13° north, close to Dakar; this fact has received the strict attention of the author and has been confirmed by him. In the country south of 13° of north latitude, both gadflies and the tsetse exist together, and there both surra and tsetse or nagana exist together. Then in the Cameroons Ziemann reports a trypanosomiasis much resembling surra: the organism *Trypanosoma vivax* cannot be distinguished from *T. evansi*. In this country the

tsetse-fly has not been found, but the gadfly and Stomoxys are abundant.

A dog that had been inoculated with mbori, and sent to the Pasteur Institute at Paris, enabled MM. Laveran, Vallée, and Panisset to carry out some important experiments, which showed that the disease in Timbuctoo was a variety of surra, but less virulent than that which had been devastating the Island of Mauritius, and that in its turn this is not so virulent as the Indian form. Lately the author has found that between Timbuctoo and Niamey there exists a form of surra that is less virulent than mbori, and he is of opinion that there are several varieties of the disease in localities in which gadflies are found of somewhat identical clinical appearances, which he designates *Trypanosomiase à taons*. He considers that "surra" is the most common form of trypanosomiasis in French Africa.

Experimental Mbori in the Horse.—Two dogs and two wool sheep were inoculated at Timbuctoo with mbori in 1903, and sent to Segou, where there were facilities for the study of the disease. The results were published, in 1904, by MM. Laveran and Mesnil in their work, "Trypanosomes et Trypanosomiases." The author's experiments were confined to experimental mbori in the horse, with a view to confirming those of MM. Laveran and Mesnil. He mentions that the woolly sheep from the Niger valley died in from twenty to twenty-five days, whereas a hairy one offered greater powers of resistance, and apparently recovered. A cat that was inoculated on July 24, 1903, died in France on November 2, 1904, that is to say, she lived for four hundred and sixty-seven days. She had two abortions, suffered frequently from diarrhœa, with extreme emaciation, and the hair fell off. The author gives in detail the results of a series of inoculations, but one typical case will suffice.

A bay entire horse, aged 12, in good condition, was inoculated on June 20, 1903, in the jugular vein, with 2 cc. of blood obtained from one of the dogs sent from Timbuctoo. He died on November 2, having lived for one hundred and thirty-six days.

Development.—The parasites were apparent on the fifth day, and largely increased in numbers on the following days. They then appeared with intermittent periods, three, four, and five days. On the sixty-eighth day they became scarcer, and the periods of intermission longer, reaching up to seventeen days. In the later stages they were seldom visible at all.

Temperature.—In the earlier stages the temperature rose every five or six days, and reached 41·5° C., falling to 36·5° C. Death took place during one of these rises.

Pulse.—The pulse increased in number as the disease developed; at first it was 30 on an average, rising to 55 on the twenty-fifth day after inoculation, 70 on the fiftieth day, and 80 at the end of three months, at which it remained stationary.

Respirations.—After the first disturbance the number of respirations increased; as a rule they were from 30 to 40 per minute.

Ocular Symptoms.—At the commencement there was a flow of tears, and petechiæ on the conjunctiva that formed rapidly and ran into patches, when the membrane became congested. They were irregular in shape, usually found on the membrana nictitans, and from 3 to 6 mm. in diameter. As the congestion diminished the petechiæ decreased

in size, forming minute pin-head spots. They finally disappeared altogether, but re-formed.

The patches were of a dark red colour, but as the disease progressed they became a bright red, orange, or yellow. They gave rise to progressive diminution of hæmoglobin. At the commencement their appearance coincided with the rise in temperature, but afterwards they did not appear to have any relationship with it; and in this case they were absent during the last forty-three days of the animal's life. The membrane in the earlier stages was deeply congested, but in the latter became anæmic.

A collection of a white gelatinous material formed in the internal angle of the eye, sometimes in considerable quantity, and its appearance coincided with that of the petechiæ.

Digestive Apparatus.—The appetite remained good throughout, except that during the febrile attacks the patient sometimes refused his grain. There were intermittent attacks of diarrhœa.

Genito-urinary Organs.—During the course of the disease the urine was normal, clear in colour, did not contain any albumin, or leave a deposit. Up to the seventieth day the quantity was normal; after that time polyuria set in, which lasted for about three weeks.

On August 22 the external organs became very painful. The next day the scrotum had enlarged and the testicles were pendulous. On the 25th the scrotum was greatly enlarged, and on the 27th the œdema had spread to the sheath and perineum. On this date both hind fetlock joints were noticed to be swollen. The swelling of the sheath began to diminish, and on the 13th three abscesses near the sheath were opened, and exit given to a large quantity of pus.

Articulations.—On October 23 there was acute synovitis of the off fore sesamoid sheath, and on the 29th a large abscess burst above and to the back of the fetlock. The suppuration stopped suddenly the next day, and the animal died on November 2.

Skin.—During the second stage of the disease the hair fell off in patches on the head, neck, shoulders, back, loins, and croup. On the bare patches were a number of small papules, the size of a millet seed, that disappeared in the course of a few days, when they formed thin black scabs that were easily removed, leaving a small superficial wound of an irregular shape, 3 to 4 mm. in diameter, of a pink colour, and from which there was a clear exudate. When the wound was not interfered with a fresh scab formed, that fell off of itself. The eruption was confluent in some places, diffluent in others.

After the fifty-fifth day there was profuse perspiration on the quarter, thighs and flanks that remained up to the last, with few intermissions; when the skin dried a white saline deposit remained.

General Condition.—At first the loss of condition was not very marked, but as the disease progressed the emaciation became most pronounced. There was never any great depression, even at the height of the febrile attacks, and there was no paralysis; but during the last few weeks of the animal's life the walk was tottering from weakness.

The other cases given by the author are the same.

The symptoms of experimental mbori can, therefore, be summed up briefly: Intermittent fever; evolution of the parasite, which can be easily discerned in the earlier stages, but with great difficulty in the later; intermittent flow of tears and formation of petechiæ on the con-

junctiva, slight œdema of the sheath, scrotum, and limbs; a papillary eruption on the skin; arthritis, and progressive anæmia.

Naturally Acquired Mbori.—The foregoing observations prove without doubt the existence of mbori at Timbuctoo, Sarafere, and Niamey, where it causes great loss, and that it is a form of trypanosomiasis very closely resembling that which is seen in Saint Louis, which was imported from Mauritania.

Diagnosis. Camel and Horse.—In the earlier stages the diagnosis is facilitated by the rise of temperature, the ocular symptoms, and the development of the parasites at short intervals. Inoculation of the grey rat and dog will confirm the diagnosis, as in these two animals the development of surra is very rapid, and the parasite is easy to detect.

In an infected country animals that are very emaciated and in bad condition should be looked upon with great suspicion. Œdema and articular complications are not always present, neither are the petechial patches, but the mucous membranes are always more or less blanched. In such cases the author advises the inoculation of a dog with a fairly large quantity of blood from a suspected animal, at least 20 cc.; the diagnosis can by this means be confirmed within a week.

In the grey rat the result is not so quick, as a sufficiently large amount of blood cannot be used, and the period of incubation will vary from fifteen to twenty-four days.

The woolly sheep of the valley of the Niger is a good subject; it usually dies on from the twentieth to the twenth-fifth day.

With the camel the blood is best obtained by means of a Pravaz syringe from the spur or angular vein of the eye, as the jugular vein is not very accessible.

The latitude is an important factor in the diagnosis in the case of horses. South of the 15th parallel north latitude mbori is most generally met with.

Prognosis.—The prognosis is bad, most cases ending fatally in the horse. In the camel some cases of immunity have been observed. Pregnant cow camels generally abort, and even if the calf is born alive it cannot be reared.

Etiology of the Stinging Flies.—The natives of Timbuctoo look upon the gadfly, *Tabanus ditæniatus* of Macquart, as the propagator of mbori, but this supposition has never been scientifically enquired into. Sergent, in experimenting with certain gadflies, was almost always able to infect rats with that species known as *el debab*. It is, however, extremely probable that under the term *el debab*, or stinging fly, the Arabs include several different species. The Stomoxys are extremely common all over both Central and Western Africa, attacking the camel, ox, ass, and horse; they greatly resemble the common house-fly, and the natives are not able to distinguish them. It is extremely probable that they also may be the means of distributing the disease.

In the Niger valley the author has noticed that a hymenoptera (*Notoglossa rufipes* of Taschenberg) is very common. It is a voracious species of wasp that preys on the Stomoxys when it is fixed and helpless by the sting being buried in the skin of the animal whose blood it is sucking, and whose thorax the wasp tears open. The *N. rufipes* has not yet been found in the tsetse-fly country.

The Stomoxys lives the whole year round, but the gadfly only

during the wet season, viz., from June to October, in the Soudan. In the latitude of Timbuctoo, where the rainfall is slight, the elevation and dampness of the air is sufficient to cause the development of the fly during this season of the year.

In addition to the *T. ditæniatus*, the author caught at Timbuctoo and Niamey the *T. rufipes* (Macquart) and *T. gratus* (Loew). They were classified at Washington by Howard, to whom the author sent the specimens, but the Stomoxys sent at the same time arrived in such bad condition as to be useless.

It seems probable that the common house-fly may also carry the contagion of mbori under certain conditions; as when a gadfly has stung an animal the common fly will wait till it has done and then feed on the blood that escapes from the puncture the gadfly has made. The feet becoming contaminated, especially in the earlier stages of the disease when the blood is full of parasites and very virulent, and it is quite possible that when flies sit on open wounds and excoriations that healthy animals may become contaminated by this means.

In the latter stages of the disease horses and camels seem to be quite insensible to the stings and bites of flies.

Treatment. Prophylactic.—If it is desired to keep a locality clear, the chance of contagion must be avoided by preventing importation from infected places. The geographical features of the locality will greatly assist in this, for example, islands, but in considerable tracts, such as those under discussion, the difficulties are enormous; contagion has existed from time immemorial, and effective supervision is almost impossible.

The Arabs in their code of law provide for the return of an infected animal to the vendor, but this measure is useless in stopping the spread of the disease, (1) because they cannot recognise it in its first stages; (2) because the animal when returned is never slaughtered, and is often removed a long way off, spreading the disease as it goes. The author mentions that at Timbuctoo, an Arab who had the reputation of being an expert only recognised three out of seventeen cases that were shown him in the early stages. The destruction of the flies is, of course, out of the question.

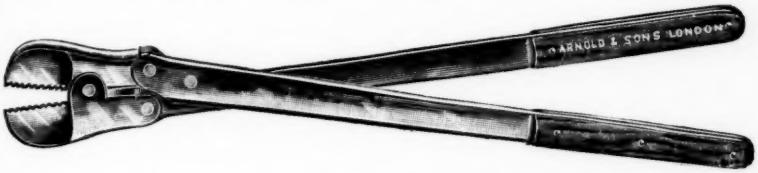
Curative.—Dr. Laveran claims to have cured rats and mice that were experimentally infected with mbori and surra by trypanroth, either alone or in conjunction with arsenic, but they were susceptible to fresh infection.

(*C. R. Academie des Sciences*, July 4, 1904, and January 30, 1905).

New Instruments and Appliances.

IMPROVED TOOTH SHEARS.

Messrs. Arnold and Sons, of West Smithfield, London, have improved, at my suggestion, the Tooth Shears made by them eight years ago for me. The advantages originally claimed for the instrument were that owing to the construction of the joints, as shown in the engraving, there was immense leverage and strength, the shortening of a tooth was instantaneous and therefore more humane.



Messrs. Arnold have now made the instrument for me in such a way that in operating the handles are pushed apart (instead of together as in the original shears) the extra force being so great that a tooth is cut with comparative ease. The cutting edges are slightly serrated, which gives a better grip.

Chas. A. Squair, M.R.C.V.S., Reigate.

A CORRECTION.

Our attention has been called to an error in our article on "Veterinary Education in America" (Veterinary Journal, December, 1906, vol. lxii., p. 667), in which, in the table of colleges, the College of Veterinary Medicine of the Ohio State University should have been credited with 175 class-room and 475 laboratory hours devoted to anatomy instead of 168 and 384 hours respectively, and in the same table the number of veterinarians on the faculty should have been increased by one.—W. L. W.

Books and Periodicals, &c., Received.

Veterinary News; Recueil de Médecine Vétérinaire; Report of the Board of Agriculture, Department of Agriculture (Ireland); Our Dogs; Revue Vétérinaire; Bulletin Vétérinaire; American Veterinary Review; Journal of the Royal Army Medical Corps; Proceedings of the American Veterinary Medical Association; Twenty-second Report of the Bureau of Animal Industry.

Letters and Communications, &c.

Mr. Grasby; Mr. Robertson; Professor Bradley; Mr. Dixon; Mr. Malcolm; Mr. Lloyd; Mr. Holburn; Colonel Nunn; Mr. Coke; Mr. J. H. Carr; Mr. R. F. Stirling.

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